THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XVII. Copyright, 1885, JAMES R. OSGOOD & Co., Boston, Mass. No. 484.

APRIL 4, 1885.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

SUMMARY: —
The Formation of a National Society of Arts. — A Suggestion as to one kind of work it might undertake. — The Burning of the State Capitol at Trenton, N. J. — An Architect convicted of Bribery. — The Richmond City-Hall Competition. — Licensing Architects in Minnesota. — Telegraphing by aid of the Heliotrope. 157
THE ARCHITECT'S AND BUILDER'S POCKET-BOOK. 159
THE CITES OUVRIERES OF MULHAUSEN. 160
CEMENTS. 162
THE ILLUSTRATIONS: —
Union Depot, Concord, N. H. — House and Stable, Cambridge, Mass. — Workmen's Cottages, Mulhausen, Alsace, Germany. — Railroad Station, Dedham, Mass. — Designs for Stained-Glass Windows. 162
FARM BUILDINGS. 163
HEATING GREENHOUSES. 164
COMMUNICATIONS: —
A Question on Flues. — Competitions. — Centre for a Groined Vault. — Echo in a Room. — Hay-Chutes. — Mediæval. — A Correction. 165
NOTES AND CLIPPINGS. 166

A MOVEMENT about which we confess to have entertained the gravest doubts has recently been initiated in New York, with the idea that it is to be propagated from that centre of intelligence over the whole country. This movement is the one for establishing a National Society of Arts, about which most of our readers have doubtless heard, and has in view "the protection and promotion of the interests of art in the United States." When we first heard of the prospects of founding such an association, we thought, not without consternation, that the grandest arena for the combats over prizes ever seen in the world was about to be opened in this country, and our apprehensions were not wholly allayed until we saw the announcement of the names of the officers chosen by the New York meeting. So long, we are glad to say, as such gentlemen as these control the new society, no opportunity will be given, under its sanction, for exercising those troops of hobbies which find pasturage on the borders of the artistic world. Of all of them, excepting the amateurs, for whom we cannot speak, it may be truly said that they understand art well enough to recognize it in its humblest manifestation, and love it deeply enough to treat every such manifestation, however obscured by falsities, or vulgarisms, with tender regard; and more than this, as expressing our sense of the fitness of these gentlemen to watch over the interests of American art, we should be at loss to say.

CONCERNING the work which the new society is to do, there seems to be a diversity of opinion. Some persons think that its function will consist mainly in the expression of opinions as to the merit of new works of art. It is hardly necessary to say that a truthful society which made that its principal occupation would soon have few members left out of jail, and it is fortunate that no such disagreeable duty will really be expected of it; but as those who control it may perhaps be themselves a little at a loss to know where their new-found influence can be applied to the best advantage, we make bold to lift up our modest voice for the offer of a suggestion which we trust may sometime be useful to them. This suggestion, based on long observation of the circumstances which affect the work of a certain class of artistic workers, is as follows: Take care of the interests of the artists, and the interests of art will take care of themselves. By taking care of the interests of artists we do not mean, of course, collecting provender in the shape of patronage, at random for them, to be carried off by the most selfish and impudent, but the encouragement of industry, the repression of blatant humbug, and above all, the effectual support of artists against the insensible sharks who delight to make them their prey. Long as is the list of architects "done" out of their time and labor by persons who laugh to scorn their requests for payment, that of artists crowded to the wall by lying dealers, deluded by fraudulent competitions, cheated of their pay and defrauded of their reputation by every possible means, must be still longer, and the society, or association, or whatever else it may be called, which shall make a duty of demanding and obtaining justice for these poor people will cheer the hearts of artists wherever its operations may penetrate, in a way which is certain to show itself in their work. As a single instance of the cases in which such aid could be given with immediate good result, we need only mention the scandalous Temple competition, in which a certain prize was offered for the best painting on a given theme which should be presented on a certain day. Most artists of ability and experience know that competitions somehow mean to them nothing but disappointment, loss, and indignation, and very few pictures were presented, but those that did come in were judged and classified, and the author of the best was then coolly informed that in the opinion of the judges his picture was not good enough to have the promised award, and he might content himself without it as best he could. Fortunately for his brother artists, but not for himself, the painter of the best picture could not swallow, with the submissiveness expected of him, either the violation of the contract under which he had spent so much labor, or the wanton insult which accompanied the fraud, and he is now, and has been for a long time, engaged in pursuing through the weary circle of the courts, the wealthy corporation and the irresponsible trustees who care so little about the trouble they have brought upon him. It is evident that he must fail, whatever the verdict may be. Even if the trustees should tire of defending their own misdeeds with other people's money, and give him up his prize, it will bring with it nothing but the consciousness of at least as great a sum, with the peace and happiness of years wasted in the attempt to secure justice from men whose so-called "eminence" among connoisseurs had simply served to delude him. It is very likely that his picture may not have been good, and indeed, it is quite improbable that any artist capable of painting a good one would have engaged in such a competition; but that has nothing to do with the point which we wish to enforce. It is sufficient to say that an artist who entered a competition in good faith is now deprived of the prize which he won in it, and is wearing out his heart in the endeavor to get it. The same thing might happen, and does happen, on a larger or smaller scale, to many artists, good and bad, every day, to the ruin of their peace of mind and to the infinite loss of art. Every one acknowledges this evil, which takes the very life out of honest and quiet art in this country, and sends our best men and women abroad to spend their days in a more congenial atmosphere; but no one has suggested a remedy for it, and it seems to be left for us to say that the best thing that could now be done for art in this country would be for such a body as the National Society of Art to take up the Temple competition case where it now is, and bring it to a speedy, just and public conclusion, for the benefit alike of the community of artists, whom the novel spectacle of justice done to one of their members would warm into an unwonted cheerfulness and courage, and of the laity, who need sorely to be taught that even if their intentions toward artists are right, they cannot with impunity constitute themselves the sole judges of the merit of questions in regard to which they may happen to have a controversy with them.

THE older State Capitols are, as a rule, so poorly built that we are not disposed to mourn much when one of them comes to grief, and when, as was the case a few days ago, one of them is burned down without the total loss of all the valuable records which should not be, but generally are, stored in them, we are tempted to rejoice that the old hulk has departed without worse mischief. The scene of the last occurrence of this kind was Trenton, New Jersey, where the front portion of the present Capitol, containing the original structure, dating from 1790, besides various additions, was, as is supposed, set on fire by an incendiary, and almost entirely gutted by the flames. Fortunately, the Court records and the papers of the Treasurer's and Secretary of State's offices were saved, the principal loss in documents falling upon the Labor Bureau, the contents of which were totally consumed. Unlike some communities, the State of New Jersey is wise enough to insure its property, and will recover indemnity enough to help it materially in rebuilding the whole of the older part of the structure with fire-proof materials, as it is now proposed to do.

A CASE has been discussed in the daily papers which has a certain interest for architects, as casting a little light upon the morals of ordinary competitions, amongst other things. According to the story, a Mr. Ellis, of Rochester,

N. Y., was interested, either for himself or some one else, in a set of competitive drawings for a jail. Discovering, by that mysterious insight which competitors for public works so often possess, that one more vote in the Board of Supervisors would decide the competition in favor of his plan, he sought a member of the Board and offered him a hundred and fifty dollars to vote according to his wishes. The supervisor took the money, but told the story, and Mr. Ellis, under the strict laws of New York, which regard the offer of money to a public functionary with a horror like that with which a Roman would have contemplated an attempt to corrupt a vestal virgin, was arrested, tried, and sentenced to pay a fine and to imprisonment until the fine be paid. It is but proper to say that Mr. Ellis denied that he was guilty, as charged, and will carry the case to a higher court.

IT is with regret, but without chagrin, that we have to announce that our siege of Richmond must be raised, since the authorities, in the person of the city engineer, refuse to listen to the terms of capitulation which we suggested, alleging as the reason of their holding out that any extension of time or change of conditions of the programme of competition — the example of Toronto to the contrary notwithstanding — would be "manifestly unjust" to those architects who had already begun work on their designs. How offering more liberal terms, an increased number of prizes, and an extension of time can be an act of *injustice* to the "several hundred" architects who, we are told, have already written for particulars, and inferentially intend to compete, we are unable to discover. As we can hardly assume that our action has had the effect of hindering in his work any architect who had decided to compete, it may be presumptuous on our part to express the sincere hope that nothing we have said or done will tend to make the result to the City of Richmond any more unsatisfactory than the original conditions compel. We therefore ask our readers to refrain from sending in further contributions, and beg to inform those who have shown themselves liberal-minded and public spirited enough to support a scheme which was not advanced by us as in any way the best, or a panacea, that these contributions will be returned to them as speedily as possible, and with them our thanks.

THE State Architectural Association of Minnesota has already made itself commendably prominent in affairs concerning the profession in that State, and will, we hope, find many opportunities for exercising the good sense and professional feeling which seems to characterize it. A law, which it has been instrumental in framing, is now before the State Legislature, to provide for the licensing of architects, and there is some prospect that it may pass, even in the short time now remaining before the close of the session. Another subject, which has recently been called officially to the attention of all the members of the Western Association of Architects and its affiliated societies, is the important one of the ownership of drawings. The profession has suffered altogether too long from the unjust precedent by means of which a malicious client can with impunity inflict severe loss upon an architect whom he takes a fancy to injure, and it is much to be hoped that the combined wisdom of the Western architects may discover some way out of the difficulty.

OUR readers may remember that a plan was formed a year or more ago for establishing telegraphic correspondence, by means of the "heliotrope," between the islands of Réunion and Mauritius in the Indian Ocean; and will be glad to learn of the complete success of the undertaking, although various mishaps prevented the establishment of the final telegraphic posts, until a few months ago. As we mentioned in our first notice of the scheme, the business interests of the two islands are closely connected, more than twenty thousand letters annually passing between them, but the main purpose in the mind of the benevolent and public-spirited originator of the scheme is said by *Le Génie Civil* to have been a provision of a means for warning the people of Réunion of the approach of cyclones. These are very frequent in winter, and terribly destructive, but as they always pass over or near the Mauritius coast from twenty-four to thirty-six hours before their arrival at Réunion, a telegraph of any kind, by putting the people of the latter island on their guard, might save much property every year, besides many lives. So important has this point long been considered that several attempts have been made to unite the two islands by submarine electric cables, but all have failed, the bed of the channel being very unfavorable to cable-laying, while the approach to Mauritius is such as to make the expense of connecting the land end of the cable very difficult.

THE credit of devising the scheme which was finally successful is due to M. Adam, a former naval officer, now practising at Mauritius as an expert before the foreign consuls in admiralty cases. Becoming convinced, from the accounts of the experiments successfully made for connecting the two shores of the Strait of Gibraltar, that similar communication was possible between the two islands, M. Adam, after studying the character and position of the signalling apparatus which would be necessary, published an account of his plan, and appealed to the public of Mauritius and Réunion for money to carry it out. A company was formed, and some influential scientific men in Paris having interested themselves in the undertaking, a grant was obtained from the French Government of two telescopes, with the necessary accompaniments, and M. Adam was sent to Paris to learn the use of them. On returning to Africa with his telescopes, he proceeded to establish his signalling stations, at the top of two mountains on the opposite coasts, about one hundred and twenty-five miles apart. The first post established was at Réunion, and as soon as the signalling mirror, which was only thirty-nine inches square was set up there, the reflected flashes of sunlight were observed without a telescope at Mauritius, under the appearance of a bright, orange-colored star on the horizon, the light being estimated at about two and one-half times that of Venus. This made it certain that signalling was possible, but the rays from the mirror reached Mauritius in a place where no station suitable for containing the telescope and other apparatus could be built; and even if a foundation could be secured, the path of the rays passed so near a bare peak that it was feared that the irregular refraction due to the currents of heated air passing over the rock, would interfere with observations; so it was decided to choose new stations on both islands.

THIS took time, as very accurate determinations of the horizon had to be made, in order to be sure of transmitting the feeble rays used in night signalling directly into the axis of the observing telescopes; and this, together with a misfortune in the shape of a cyclone, which demolished the station at Mauritius, and nearly ruined the apparatus placed in it, delayed the work for some months. The interval was spent in repairing the damage, and in some clever calculations for determining the exact line of sight with regard to the sun, through which M. Adam was able to send word from Mauritius to his partner at Réunion that if, on a certain day, when the apparatus would be again in position, he would direct his telescope at the centre of the sun, as it rose above the horizon, and fix it in that position, he would see through it later the reflection of the mirror at Mauritius. This ingenious piece of amateur applied astronomy was perfectly successful, but it was found that the great height of the station at Réunion above the sea interfered so seriously with continued observations that it was decided to find a lower one, and the apparatus was again moved. This was the last change, and on the twelfth of last July, the telescopes were finally pointed in exactly the required direction, and the interchange of messages began. Through the telescopes, the day signals, made by reflected sunlight, are of dazzling brilliancy, while the light of an ordinary petroleum lamp is sufficient for night work; but it is intended to use an electric light as soon as the prospects of the company will warrant the expense. It is worth noticing that the height of the signal-station at Réunion above the sea-level is only about two thousand feet, while that of the Mauritius station seems to be nearly the same; and if this height, as appears to be the case, serves perfectly for signalling at a distance of more than a hundred miles, it seems probable that the system might be extensively used in moderately mountainous countries. By careful selection of stations, for instance, there seems to be no reason why signals should not be sent in this way, by three or four steps, from Paris to Rome, and in our own country there would probably be a succession of peaks of sufficient height for the purpose, and spaced at about the necessary distances, from the centre of Maine, by way of the White Mountains, the Adirondacks and Catskills, the Hudson Highlands, and the various chains of the Blue Ridge, as far as the middle of Georgia.

THE ARCHITECT'S AND BUILDER'S POCKET-BOOK.[1]

To those architects who have been accustomed to refer in all their difficulties to the invaluable Trautwine, the idea that any person should attempt to write a book to supersede Trautwine in their libraries will probably seem at first not only audacious, but in some degree profane, and the author of such a work must inevitably encounter the criticism which is visited upon all who appear to be desirous of insinuating themselves into the place of others better known than themselves. Yet, it is not too much to say that something like one-fourth of Trautwine's book is never so much as glanced at by architects, and much of the rest is expressed in a way which makes it of comparatively little use to them; and Mr. Kidder's attempt to collect by itself all the information contained in the ordinary engineers' hand-books which architects need to use, and to add much more matter which is very useful to architects, but not to engineers, is a perfectly legitimate one; to say nothing of the fact that Mr. Trautwine's book was first published about fifteen years ago, and that within this period new determinations of the resistance of materials have been made, which, although they alter the very foundations of the old rules for calculating the strength of structures, are in Mr. Kidder's book placed for the first time in available shape before those who will make the most use of them. We do not, as will be seen, consider the work beyond criticism, but we may begin by saying frankly that we never realized, until we read it, how much more useful engineering text-books might be made to architects by the adoption of familiar architectural forms and examples for their illustration; or how many things there were which architects, and not engineers, like to know and to refer to, which have never, before Mr. Kidder's book appeared, been collected in a form convenient for ready consultation and comparison.

Like Trautwine, Mr. Kidder's book begins with some elementary mathematics; a few explanations of signs and rules for extracting square and cube roots being given as the arithmetical portion, with the common tables of weights and measures, and methods for determining areas and volumes of different figures and solids, to represent mensuration, and thirty-eight very well selected geometrical problems. After these comes, what is not found in Trautwine, an excellent series of trigonometrical formulæ, taken from Searle's "*Field Engineering*," for the solution of oblique triangles as well as for general problems. Each division of this preliminary part is illustrated by copious tables; those of natural sines and cosines, tangents and cotangents, which accompany the trigonometrical portion, being, as it seems to us, more conveniently arranged than the corresponding ones in Trautwine, although only five places of decimals are given instead of Trautwine's seven. Of the tables of weights and measures we cannot speak with the same approbation, one or two of these being, to say the least, of mediocre interest to those for whom the book is designed, while others might with advantage be rendered more complete than they now are. We find, for instance, space occupied by a table giving the number of gallons in a puncheon of "Scotch whiskey," "of brandy," and other drinks, which might, we think, be better employed. If a puncheon of Scotch whiskey were a more definite quantity, we might be disposed to regard it, as a measure, with more consideration; but as, according to the table, it varies from one hundred and ten to one hundred and thirty gallons, in conformity, we suppose, with the moral character of the seller, we fail to see any reason for including it, or the similarly elastic measures of capacity for other alcoholic beverages, among the statistics which particularly concern the profession of architecture. Moreover, if the whiskey and rum table were left out, space would be gained for adding to the table of cubic measure, which comes just above it on the same page, some very important as well as interesting particulars. A "perch" of stone, for example, is given, with strict accuracy, as $24\frac{3}{4}$ cubic feet, and a note is added, mentioning that a "perch" in Philadelphia means 22 cubic feet, and that in some of the New England States it is taken at $16\frac{1}{2}$ cubic feet; but nothing whatever is said about the perch of 25 cubic feet, which is really the standard in all but exceptional cases, and, where there is likely to be any dispute as to local custom, is usually distinctly specified by architects. To this table might well be added also a definition of such very common measurements as the "square" of excavation, meaning six feet cube, or 216 cubic feet, the "rod" of brickwork, or 306 cubic feet, which, though strictly an English standard, is often used here by English workmen, and the "load" of sand, gravel or earth, which should be a cubic yard, but varies from 18 cubic feet, which is the usual seller's load, to 27, which is the buyer's standard. It would be worth while also to mention here the fact that stone is often sold by the cord, as well as by the perch, load, or cubic foot.

Most of the other tables are well chosen, and those giving the antique measures, although one would hardly expect to find them in an architect's pocket-book, will undoubtedly be found useful in those historical and archæological studies which most architects promise themselves the pleasure of some day taking up. The tables of the metric system might perhaps be made more convenient, and it is a mistake to give, as the expression for a thousand kilograms, only the word *tonneau*, instead of *tonne*, which is used far more frequently than its old-fashioned synonym.

The portion of the book devoted to geometry and mensuration, with the exception of an occasional inadvertence, like that on page 36, which defines the quadrilateral as a polygon of three sides, is excellent, and the diagrams are generally neatly drawn. We could have wished to see more attention given to the ellipse, a figure which architectural draughtsmen often have occasion to draw, and generally draw badly. Three methods are given for describing it; the first being a pretty one, common in French books, by which two concentric circles are drawn, with radii equal to half the longer and shorter axes of the ellipse, and radiating lines having been drawn through both circles, the points on the circumference of each cut by the radiating lines are connected by horizontal lines drawn from the points on the smaller circle, and vertical lines from the points on the larger circle, the intersections of these horizontal and vertical lines being points in the ellipse required. The other two methods given are those with the string, and two pins at the foci, and the straight-edge with points travelling on the two axes, both of which, though convenient for marking out a flower-bed, or an oval for a driveway, are quite unfitted for draughtsman's work, and should be supplemented by descriptions of the common method of striking intersecting arcs from the foci as centres, with any two segments of the longer diameter as radii, and of the mode of drawing normals to the curve, for convenience in laying out the joints of elliptical arches. After the ellipse, Mr. Kidder gives explanations and diagrams of the parabola and hyperbola, and, like Trautwine, completes his collection of curves by the cycloid, of which he gives a diagram, and a method of drawing the curve, a little carelessly described. For architects' use we should have been glad to have had the list extended by the addition of the beautiful "arbor arch," as the carpenters call it, described by dividing the longer and shorter sides of the rectangle circumscribed about it, with sides parallel to the major and minor axis, each into the same number of parts, and connecting the points of division, beginning with the one nearest the end of the major axis on the short side of the rectangle, and that farthest from the end of the minor axis on the long side of the rectangle, by straight lines, which will be tangent to the required curve. This arch is more easily drawn, and far more readily enlarged in scale, than either the ellipse or the cycloid; and deserves, both for its beauty and its strength, to be more generally used than it is.

With Part II begins a brief, though systematic explanation of the common modes of calculating stresses in arches, beams and frames, with tables of the resistances of all the principal materials used in architecture. To our mind, this is the most useful, as well as the most original portion of the book. Mr. Trautwine gives, indeed, much of the same sort of information, but it is scattered through the book, his directions for finding the line of pressure in an arch and its abutments, for instance, being distributed in four different articles, the first being separated by nearly a hundred and fifty pages from the one containing the conclusion; and his method for determining this, as well as other kinds of strain, is not, when ascertained, so comprehensible and modern as that which Mr. Kidder follows. There are, as will be seen, many points in which Mr. Kidder's chapters on the general subject of strength of materials and stability of structures stand much in need of revision; but, with all their imperfections, they present, both in matter and form, the most useful brief collection of rules and data yet available to young architects.

After a few pages of definitions and explanation of terms, the various problems of strength and stability of structures are taken up in the order in which they occur during the construction of a building. There is more virtue in this choice of sequence than may at first appear. To the mathematical mind the theory of composition and resolution of forces is a thing to be first studied by itself, and applied later to such problems as may be capable of being solved by it; but the busy young architect or builder has, or thinks he has, no time to master one or two hundred pages of theory before he can understand the rules bearing on the point of practice which immediately concerns him, and Mr. Kidder's method, of following the successive steps of actual building, and working out his rules at just the points where their application is necessary, will make his book invaluable to hundreds in whom the very name of applied mechanics has hitherto excited nothing but terror.

Like the structures to which it relates, Part II begins with Foundations, collecting a great deal of information, and many rules and examples, into a chapter which needs, for completing its excellence,

[1] *The Architect's and Builder's Pocket-Book* of Mensuration, Geometry, Geometrical Problems, Trigonometrical Formulas and Tables, Strength and Stability of Foundations, Walls, Buttresses, Piers, Arches, Posts, Ties, Beams, Girders, Trusses, Floors, Roofs, etc. By Frank Eugene Kidder, C. E. New York: John Wiley & Sons, 1885.

nothing but a little more careful revision. Not only do some minor slips need correction, such as the assignment of the Lock Ken viaduct to Bordeaux; the designation of "fir," a timber unknown in this country, as one of the materials appropriate for piles; or the quotation of Sanders's formula for pile-driving without specifying whether the "sinking at the last blow" in the denominator is to be measured in inches or by some other standard; but there are some items of practical information which are, to say the least, questionable; such as the paragraph which treats of "Foundations on Compact Stony Earths, such as Gravel or Sand," in which it is stated that in soils of this kind drains should be made "at the bottom" of the trenches "to carry away the water;" a proceeding which would be very likely to result in undermining the wall in anything like a sandy soil; or the closing suggestion in regard to pile foundations, in which, after quoting Sanders's rule, the author remarks that "in ordinary pile-driving for buildings, . . . as the piles are seldom loaded to their full capacity, it is not necessary to be so particular as in the foundations of engineering structures." It would be interesting to know what difference Mr. Kidder finds between "a building" and "an engineering structure" in regard either to the pressure which they exert on their foundations, or the propriety of making sure, by suitable calculations, that neither of them will fall down. There is no point of building which is more shamefully neglected by contractors and cheap architects than that of securing safe pile foundations in "made" land; and Mr. Kidder should have hesitated long before encouraging a carelessness which is bearing bitter fruit in many of our maritime cities, by lending his authority to the notion that "it is not necessary to be particular" in regard to such matters. We are sorry to find, later, that this dangerous maxim is further supported by Mr. Kidder's table, "showing the permissible loads on various kinds of foundation beds, per square foot," in which rules are laid down which are anything but "particular." Passing over the standards given for gravel and clay, which err rather on the safe side, we find the safe load for "piles in artificial soil" given at four thousand pounds each; while "piles in firm soil" are allowed "thirty thousand to one hundred and forty thousand pounds each." What would be the proper load for piles driven through "artificial soil" to a stratum of "firm soil," which is the ordinary state of things in city pile-driving, we are not informed; but the worthlessness, or worse, of all such rules may be illustrated by an experience of our own, in which, on driving a large number of piles for a certain building, a cluster of them, reaching, probably, some fault in the supporting stratum, showed, by Sanders's formula, a resisting capacity of two tons each, while nearly all those around the spot, and for a considerable distance beyond, brought up with a sinking which indicated a resistance of eight to nine tons. In such cases as these, which are common enough in districts of made land, the application of Mr. Kidder's easy-going rules would lead infallibly either to the placing of a dangerous load on the piles in the soft spot, or, by the adoption of a standard of loading adapted to these, to the driving, for the rest of the building, of more than four times as many piles as there was any need of.

Having made these criticisms, we can with a clear conscience praise the remainder of the chapter, and go on to the next, pausing only for a moment to notice some illustrations of foundations for high chimneys, models of their kind, which Mr. Kidder copies, giving, as he supposes, proper credit for them, from "the latter part of a work by Mr. George T. Powell." We had once the pleasure of reviewing the work referred to, in which, as we were grieved to find, Mr. Powell's part was that of a somewhat surreptitious compiler of other people's ideas; and the entire portion of his book containing the diagrams and descriptions of chimney foundations is simply a judicious appropriation of a little work published some years ago in Chicago by that excellent architect, engineer and citizen, Mr. Frederick Baumann, to whom, and not to Mr. Powell, the credit for the chimney designs should be given.

We need not enter minutely into the half-dozen chapters succeeding this. In brief, they contain the simple methods of modern applied mechanics for determining the strength and stability of piers and buttresses, arches, iron tie-rods, rivets and eye-bars, wooden and iron columns, beams of iron or timber, and trusses and frames of all ordinary kinds in wood and metal. Our readers know already our high opinion of the merits of this portion, and our only regret is that a little carelessness in the proof-reading should here and there have obscured the clearness of the diagrams and explanations. In one or two cases, for instance, the letters in the diagram do not agree with those in the text intended to refer to them; in the chapter on arches the plates for the diagrams are tilted out of place, so that lines described as horizontal or vertical make a very appreciable angle with their proper directions; and errors in punctuation, or little slips in the choice of a word, sometimes make it difficult at a glance to understand the meaning of the author's sentences; while, as we think, a rather too liberal construction of the ordinary rules is occasionally suggested. It is to be remembered that the persons who will use books of this kind are constantly tempted to overstep the bounds of perfect safety in the application of the methods which they find given; and if they find the author stating on one page that in order "that an arch shall be stable, it is considered necessary that it shall be possible to draw a line of resistance of the arch within the middle third," and on the next page, after calculating a line of resistance which does not lie within the middle third of the arch tested, dismissing the subject with the easy comment that "If it" (the line of resistance) "had gone outside the middle third to a very great extent, we should have considered the arch unstable," they will be likely, if severely tempted, to improve considerably on Mr. Kidder's idea of what constitutes a serious "extent," and to design arches, perhaps of the most perilous construction, in strict accordance, as they imagine, with the rules which Mr. Kidder intended to prevent such practices. It is true that, with an arch well cemented together, a slight deviation of the most favorable pressure curve beyond the limits of the middle third may not be immediately followed by the crushing of the stones where the curve approaches nearest the intrados or extrados, or the opening of the outer portion of the joints; but time, and the changes in the mortar, or the masonry, may give the destructive forces full play, and in any case it should be remembered that the pressure on the joints of an arch is divided equally by the curve of resistance, and that if this approaches too near either to the extrados or intrados, one-half of the total pressure may easily be concentrated upon so small an area as to compress the stone far beyond its strength.

It would take much too long to mention even half the points in which we think some slight improvements might be made in the book, but most of them will occur to nearly all its readers, and as corrections or changes can readily be made in subsequent editions, it would be ungracious to dwell long upon the inevitable oversights of the first edition of a book which, as a whole, admirably fulfils its purpose of becoming an indispensable companion in the work of every architect, young or old.

THE *CITÉS OUVRIÈRES* OF MULHAUSEN.

Staircase · Tours · Cath.al, France

MULHAUSEN is a busy manufacturing town located in the southern part of Alsace, a few miles from the Rhine. It has a population of about 70,000, and with the adjoining towns of Dornach and Napoleonsinsel, forms the centre of very extensive milling and paper industries. The various factories give employment to a vast number of hands, and as long ago as 1836, the question of the proper housing of the laborers began to assume an importance, which called for some public action. Any one who has visited a Franco-German manufacturing town, can appreciate how Mulhausen might have appeared fifty years ago. Considerable was done by the city in the way of enactments and tenement-house regulations, but finally a society was organized chiefly through the efforts of M. Jean Dollfus, one of the heaviest manufacturers, which had for its object to provide suitable homes for the poorer classes. The work and methods of this society have stood the test of thirty years, during which time the country has passed through two wars, and has finally even changed ownership, owing to the consequences of the Franco-Prussian struggle. A study of the results achieved cannot fail to be of value to every one interested in economical building or social reform.

First, as to the society itself. In a measure only is it a benevolent institution. That is to say, it does not primarily undertake to provide lodgings, but simply builds houses such as in its judgment seem best adapted to the wants of the people, and sells them at a price sufficient to cover the cost of erection, including transfers, insurance and interest during the time allowed for payment, retaining what is virtually a mortgage on the property until the whole, including the land, is finally paid for. If buyers should not present themselves as the houses are completed, they are let at a rent amounting to eight per cent of the total cost, though the terms of sale are so reasonable that the mechanics generally prefer to buy. The society was founded in 1853, under the name of *La Société mulhousienne des Cités ouvrières.* The capital stock subscribed amounted to 300,000 francs, subsequently raised to 350,000 francs. Beyond this the State voted a subvention of 300,000 francs, which was entirely devoted to meeting the expenses of new streets, sidewalks, sewers and other works of a public nature, in order that as far as possible the individual purchasers need pay for no more than the cost of the building and the land. The principal source of direct revenue has been the renting of unsold

houses, the money so derived going to pay interest at four per cent on the capital stock, and meet expenses of appointments, salaries, etc., any surplus being devoted to works of a general public character. As the tenants are charged five per cent interest during the period of payment, an additional one per cent surplus is also made available for extensions of the work. In order that the long terms of payment should not interfere with the progress of the building operations, the society borrowed on its property some 300,000 francs, which sum was easily obtained at four per cent interest.

For the location a large tract of level land was selected lying between Mulhausen and Dornach, the cost being from seventy centimes to one franc per square metre. Several streets were laid out, and everything seems to have been done very systematically from the start, so that as far as the *Cités* are concerned, there has been little cause to regret past arrangements. Previous to the actual organization of the society, M. Dollfus had made some experiments in Dornach with a view to determine what manner of house would best suit the needs of the working people. Four houses were erected, and after having been in use for some time, the tenants were questioned, and careful notes taken of all practical points, two different types being finally adopted which served as models for the buildings erected by the society. It is doubtful if either of these types would specially commend themselves to American investors, but the result has shown them to be quite satisfactory to the average Alsatian workman.

The houses are sold under the following conditions. A first payment is made of 250 to 300 francs, according to the value of the property. This amount is placed to the credit of the purchaser, and serves to cover any expense of taxes or legal fees when the contract is finally delivered. Interest at five per cent is reciprocally charged, and allowed on the total cost, and on the monthly payments in exactly the same manner as in the case of partial payments on a note of hand, though the interest on the payments is computed monthly while the interest on the principal is estimated only on the amount remaining due at the end of the year, a slight advantage thus being allowed the purchaser. The payments are made at the rate of twenty-five francs per month for a house costing 3,000 francs. This amount is no more than would be asked in the town for the simple rent of a much smaller apartment, while it is only slightly in advance of what the society would ask for hire of the same premises, since the interest on the money is but five per cent, while the rent amounts to seven. As an example of how this would work we will suppose a house costing 3,000 francs. The first year the payments amounts to 600 francs; for the next twelve years they are 300 francs per year, so that in thirteen years and five months the buyer will have paid in all 4,326.80 francs. Had he rented the same house at eighteen francs per month he would have paid for the same length of time, 2,873 francs; consequently the purchase of the house has necessitated an extra saving of only 1,453.80 francs, or about one hundred francs per year. If after a number of payments have been made the buyer for any sufficient reason decides not to purchase the property, the society allows him to withdraw, charging him rent for the time the house has been occupied, and refunding the difference between that amount and the total of his payments, plus interest on the first payment of 300 francs.

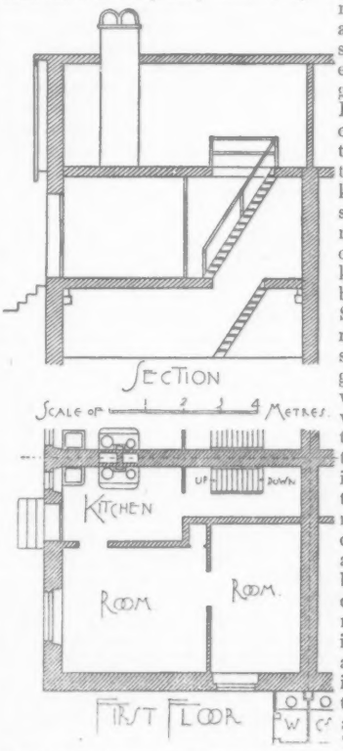
In order to prevent outside speculators from buying up a number of the houses, and selling them to the detriment of the class for whose good the society was organized, the houses are sold only on condition that the purchasers shall not sell out inside of ten years; nor sub-let any part of the property without special authorization from the council of administration. At the same time a transfer of the house to another *bona fide* workman is always allowed, and if a family has spare rooms and desires to increase its income by taking in lodgers, no objection is made thereto, as the manifest object is to pay for the property in a shorter time. Indeed it has been found that in proportion as the balance due becomes diminished, the tenants become less willing to sub-let their rooms. The society also reserves certain rights of enforcing repairs, and a due regard for cleanliness during the ten years after sale. The tenants may by special permission make any desirable additions to the houses without infringing on adjoining property, and in looking over the colony it is remarked that many of the houses have been enlarged in some way, either by dormers or Ls. The shade and fruit trees and the enclosures must be maintained by the proprietor, who must keep the garden in a good state of culture. In case the monthly payments are not made with sufficient promptness, the society takes possession of the property, charging the tenant rent at eight per cent for the time it has been occupied, and reselling at its discretion.

The society has not confined itself to building houses for sale only. As no stock dividends are allowed, there is every year a surplus from the rents, etc., which allows of some enterprises not originally contemplated. Thus a large house has been built, divided into rooms simply furnished, which are rented at the low price of six francs per month to single men. The society, together with the city, has also built a *salle d'asile* for 250 children, and has given two houses, rent free, for a Sister of Mercy and a doctor to care for the sick. A fine church has been erected, though not directly by the society. There has further been provided for the use of the inhabitants of the *Cités ouvrières*, who now number more than 7,000, a bakery where bread is sold at cost to the amount of from six to seven thousand francs per month. There is also a restaurant, very plain and simple in its appointments, but where good, well-cooked food can be had at a very cheap price, a dinner with bread, soup, boiled beef, and two kinds of vegetables, costing only sixty-five centimes. Adjoining the restaurant is a well-stocked circulating-library in both French and German. The society has also constructed a number of bath-houses where nearly 10,000 people bathe themselves annually at a cost of fifteen centimes per bath. There are also several laundries which have proved a great help to the people. They are supplied with an abundance of hot water derived from the condensers of the steam-engines in the adjoining factories, and have accommodation in all for about 350 washers at a time: 40,000 lots of clothes are washed here per year. The cost is but five centimes for two hour's use. These laundries are in part provided with drying-rooms and centrifugal wringers, for the use of which an extra charge is made.

Besides all this, the society has endeavored to further lessen the expenses of the people by selling at cost many articles of prime necessity, such as potatoes, oil, coke, stoves, etc. It has sold over 700 oil-stoves, and in three or four years has disposed of more than 6,000 ready-made coats at a price of 6 francs 50 centimes each.

The work of the society has had a very marked effect on the towns adjacent in the way of making possible a better class of buildings for the poor. Mulhausen has grown very rapidly in population during the past quarter of a century, and the new structures erected for the working classes between the *Cités ouvrières* and the town proper have in general followed the system adopted by the society, with prices lower than would otherwise have prevailed; while landlords of the crowded buildings in town have been obliged to make constant improvements in the accommodations they offer, in order to keep their tenants from migrating to the newer and more spacious suburb.

The buildings of the society are of three descriptions: First, those in blocks of ten, eighteen and twenty, the houses in two stories, back to back and side to side; an arrangement permitting of such limited provisions for light and ventilation that it was seldom used. Second, houses in rows; open at front and back; which was an improvement in arrangement, but not the best, besides having been built on a larger scale than is now called for. Third, houses in groups of four, which scheme has been finally accepted as the most successful, and is invariably followed in present constructions. A plan showing a quarter of one such block is given herewith, and the sketches will afford an idea of the exterior disposition. The house shown in plan is but one-story high, which is the kind commanding the readiest sale, and of which the greatest number have been erected. In the two-story houses the upper part is divided into three chambers, and the loft in each case is frequently utilized by the tenants as extra space for rooms, dormers being often added. As delivered by the society, the four houses or tenements are covered by a single unbroken roof in common. Each house has a good, dry cellar under the whole. In the main story, the entrance to the house is through the kitchen, an arrangement possibly intended to encourage neatness on the part of the occupants. Opening from the kitchen is the living-room, and beyond that a small bedroom. Stairs go up and down at the rear of the kitchen. The construction is substantial and good throughout, the exterior walls being of rubble stone-work covered with stucco, and the partitions of brick. At the base of the outside walls is laid a course of asphalt fifteen mm. thick, to prevent moisture from rising. The ceiling of the cellar is lathed, and the space between the beams filled with plaster and cinders to keep out any dampness. The kitchen is paved in brick; elsewhere the floors are of plank. The first floor is 0.80 m. above grade level; the cellar 1.80 m. high in clear, and the main story 2.70 m. The roof is covered with tiles.



For the sanitary arrangements the kitchen waste and the water from the roof are led directly to the open street gutters, and thence to the sewers. There is no gas or running water in any of the houses, but hydrants are located on the streets at convenient intervals. A privy is attached to each house, one cesspool of a capacity of one-and-a-half cubic metres answering for two families. The cesspools are built of masonry, tightly cemented inside, and are emptied regularly by the city authorities.

Among so many workingmen one must expect to find families which will be dirty and disorderly, and many houses which are badly taken care of; but a visit to the *Cités ouvrières* is most gratifying as showing how much the society has done not only towards providing good, comfortable homes for its *protégés*, but also towards educating

them to properly care for themselves. Each house has a garden all around it, and in the streets, the society has planted rows of trees, so that in spite of occasional dilapidations the *Cités* as a whole present a very good aspect. In many cases by reason of additions and alterations the houses have assumed quite a picturesque appearance, and while none of them have the slightest pretensions to architectural effect, they can be made to look neat and homelike, and it is evident that the owners take a pride in them. One of the best achievements of the society has consisted in teaching the workmen to take care of themselves, and to economize by small monthly savings.

In order to meet different wants, some of the houses have been made smaller than is shown on the plan. but it has been found that those which are not more than 5.25 m. by 5 m. are best suited to the desires of the people. A house of this description, one-story high, is sold at a price of 3,000 francs. A house with two stories costs 1000 francs more. The land, of which there are 228 square metres to each family, costs about 200 francs. According to the report of the society for 1881, there had been erected in all to that date 996 houses at a total cost of 2,957,875 francs, all of which had been sold at a price of 2,932,475 francs. The payments on the houses had amounted to 3,845,734 francs, 95 centimes, a sum of 517,0[illegible]7 francs, 65 centimes remaining due. Since 1881 forty-four houses have been erected. The value of the property has greatly increased since the society first began to build, so that now its operations can be said to have amounted to a total, in round numbers, of four million francs.

C. H. Blackall.

CEMENTS.

After a lengthy practical investigation upon the subject of hydraulic cement, during which time I tried to deal knowingly with the phenomena of hydraulics, I succeeded in deducing an abstract formula, which will, no doubt, throw light upon the allotropic conditions or stages of hydraulic cement. This formula shows, first the proper composition of the raw material or rock, then the rock after calcination, and again the cement (as an impalpable powder) after hydration, which is generally performed at the place of use. The formula is as follows: —

(1) Before Calcination. — Rock.

$$9\ Ca\ CO_3 + 3\ Si\ O_2 = \text{Cement Rock.}$$
$$74.85 + 15.15 = 100 \text{ per cent.}$$

(2) After Calcination. — Cement.

$$5\ Ca\ O + 3\ Si\ O_2 = \text{Cement (ground).}$$
$$62.50 + 37.50 = 100 \text{ per cent.}$$

(3) Cement after hydration. — Rock.

$$5\ Ca\ O + 3\ Si\ O_2 + 5\ H_2\ O = \text{Rock.}$$
$$38.46 + 25.08 + 38.46 = 100 \text{ per cent.}$$

Again, I would state that if a rock varies from the per cent of carbonaceous and argillaceous matter indicated in stage No. (1) in the formula, it either becomes a fat lime by an excess of the lime constituent, and a consequent decrease in the argillaceous factor, or on the other hand it approaches in composition and character a Roman cement or puzzalano, which is always inferior in bonding properties, to a cement resulting from a rock which comes under the proportions indicated in the first stage of the formula.

It will be readily seen by an observing mind, that by the loss of carbonic acid gas (a constituent of all carbonates) during the calcination of the rock, the limits in composition for the best hydraulic cement cannot vary from the figures stated in the second stage of the formula. Now we have succeeded in converting a rock of the proper proportions into an anhydrous silicate of lime and alumina, which only requires the admixture of water to convert into a hydrous silicate of lime and alumina, in which state it is much more dense and hard than the rock from which it was made. To prove my foregoing statements, I will give the approximate analysis of various foreign and domestic Portland cements, which are acknowledged to be the best upon the market.

White's English Portland, sixty-three lime base to thirty-seven acid radical.

Dyckerhoff & Son's, manufactured at Bingen-on-the-Rhine, sixty two lime base to thirty-eight acid radical.

Saylor's (American) Portland, sixty-four lime base to thirty-six acid radical.

As these are the standard cements now in use, and all seem to give entire satisfaction, it will be perceived that they do not vary much in composition from the second stage of the formula, though they are produced at points far distant from each other. Of course the proper composition of a cement rock indicates to the manufacturer the elements of success, while it does not insure it, for a producer may have all the raw material of the proper composition that could be imagined, and yet for want of scientific knowledge in the manner of manipulation, he will utterly fail in giving to the consumer the article desired. Unfortunately, Nature neglected to make a Portland-cement rock of the exact composition and structure that it would require only calcination to fit it for the market, or in other words, the same process in manufacture that our domestic cements receive. Now should a prospector be so successful as to discover a pocket of calcareous rock, which by analysis would give the desired proportions for the production of a Portland cement, and should endeavor to manufacture by the process employed by all the producers of the United States, he would encounter entire failure, because of the wide difference in the structure of his raw material. Those who have examined carefully a cement rock with the naked eye have no doubt noticed that it is made up in the plan of a foliated structure; one lamina may be pure calcite ($Ca.CO_3$), which can easily be detected by its characteristic form of crystalization, while immediately under or above it you will perceive a corresponding lamina of pure silica (SiO_2). Now it is evident that the structure of a rock of this kind is such that the lime cannot unite with the silica during calcination, hence the desired chemical union can under no circumstances be formed, and the product will be an inferior cement, too quick in bonding properties for general use, though the composition for a true Portland existed. For this reason, if the material intended for the production of a Portland cement be of a natural formation, it will require a reduction to an impalpable powder, a tempering with water, and a thorough "mix," so that the constituents of the mass may be in intimate contact, and therefore when the process of calcination is performed, the desired union or formation of a silicate will take place. Not only is the "mix" important, but the burning of a Portland cement can in no manner be neglected; it must be performed with the greatest care, first, dehydration, then the expulsion of carbonic acid gas, and immediately after this has been accomplished a constant white heat is required for the chemical union of the carbonaceous and argillaceous constituents, which is kept up until surface vitrification takes place, when it can be presumed that the desired result has been effected; that in other words, an amorphous silicate of lime and alumina has been obtained. Again, if the white heat is kept up too long, the product will be what I would term an impure glass, which if reduced to a powder will exhibit no bonding properties, or at least, if any union takes place it will be extremely feeble. It will be readily perceived that the manufacture of a Portland cement requires a certain scientific knowledge of the constituents with which a producer has to deal. Where is the man who can say, you have such and such per cent of this element, and so much of the other? for many terrenes, though alike in structure and appearance are widely different in composition; for this reason alone it is highly important for those who undertake the manufacture of Portland cement from the natural raw material of this country to be capable of quickly ascertaining the exact composition of the material from any locality of the quarry. Unless there is a head of this kind in the management of a cement manufactory, success is most likely to be wanting, for uniformity in production is the only thing that will insure compensating returns. I would here suggest to men of capital that we Americans have the material for the production of Portland cement, and should be supplying our own demand.

R. W. B.

Washington, D. C., January 29, 1885.

THE ILLUSTRATIONS.

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

UNION DEPOT FOR THE CONCORD R.R., CONCORD, N. H. MR. B. L. GILBERT, ARCHITECT, NEW YORK, N. Y.

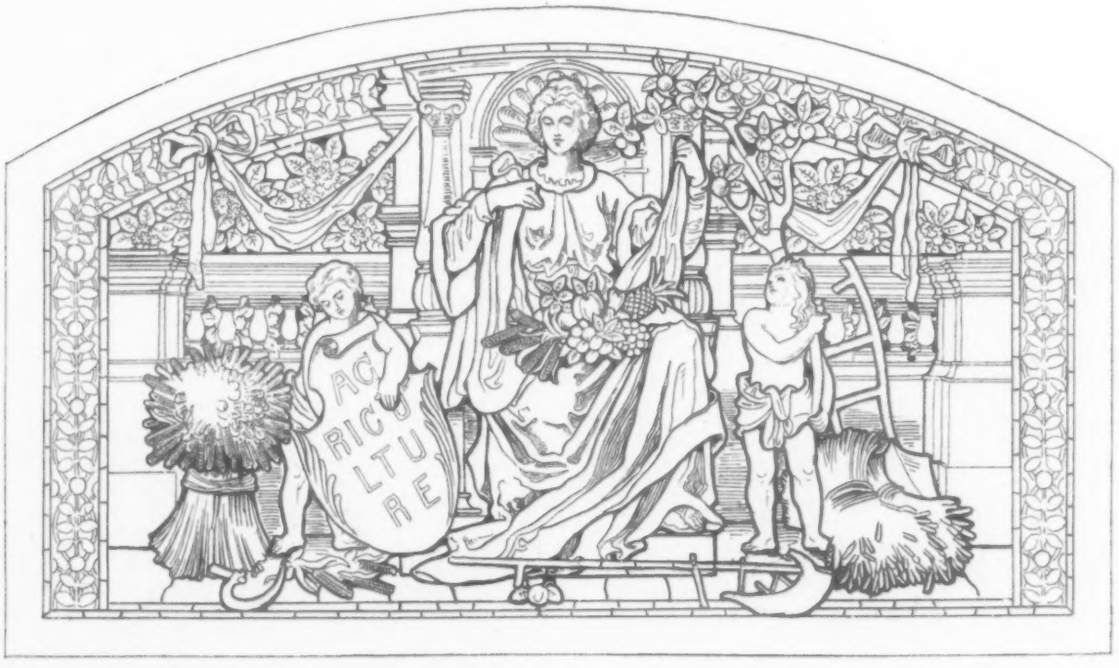
The drawing shows the head-house built of brick and rock-faced granite, and relieved with some touches of terra-cotta, and measuring 60′ x 218′: the train-house at the rear is to be of iron, and will measure 105′ x 770′. The pitch of the roofs is exceptionally steep, and the eaves are overhanging and well weathered, not a gutter having been provided; but to prevent danger or discomfort, a strong, iron frame awning projects over the sidewalk on three sides, the train-shed protecting the east side. The building is divided at the centre by a large, open rotunda into two wings, the entire ground floor being utilized for passenger and train service. Above the ground floor, the south wing will be occupied by the officers and offices of the Concord Railroad Company, and the north wing by the Northern and Concord & Claremont (N. H.) Railroad Company offices, etc. The central rotunda is about sixty feet square by over sixty feet in height, open to the roof, and showing the construction of the walls and open trusses. The floor will be of tiles or marble slabs, laid over brick arches, solid and permanent. At the west or street side, wide iron stairways lead to a wide gallery, extending around three sides of the rotunda, about seventeen feet above the floor line. On the east end under the gallery are placed wide doors opening into the train-shed, and a large, open fireplace with a front of rock-faced, dark red stone, and a shelving top, bevelled back. Over the gallery (covering a space of about

COPYRIGHTED 1885 JAMES R OSGOOD & CO

DESIGNS FOR STAINED GLASS.

BY

J. & R. LAMB.



HELIOTYPE PRINTING CO. BOSTON

CO., CONCORD, N.H. B.L. GILBERT, ARCHT. NEW YORK CITY.

HELIOTYPE PRINTING CO. BOSTON

No. 474 American Architect and Building News, Apr. 4 1885

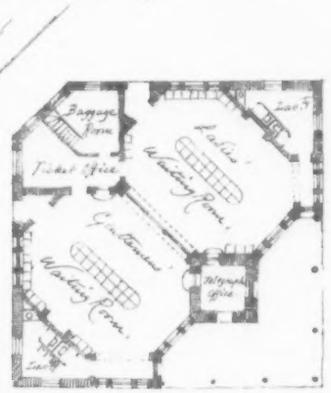
COPYRIGHTED 1885 JAMES R OSGOOD & CO

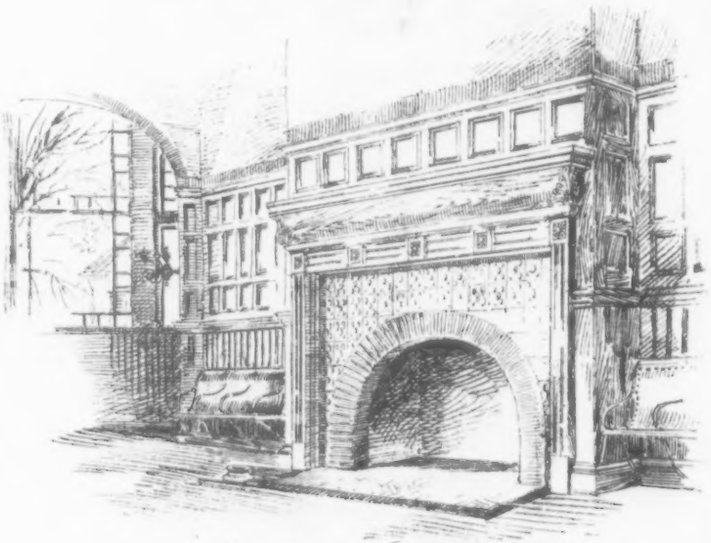
Dedham : Station : Mass :

on the Boston & Providence R.R.

Messrs. Sturgis & Brigham.
Architects : Boston.

General View from the Approach Road

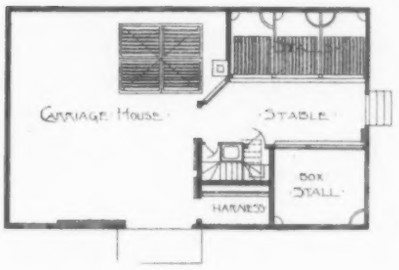




Pencil Sketches by E. Eldon Deane

HELIOTYPE PRINTING CO. BOSTON

COPYRIGHTED 1886 JAMES R OSGOOD & CO



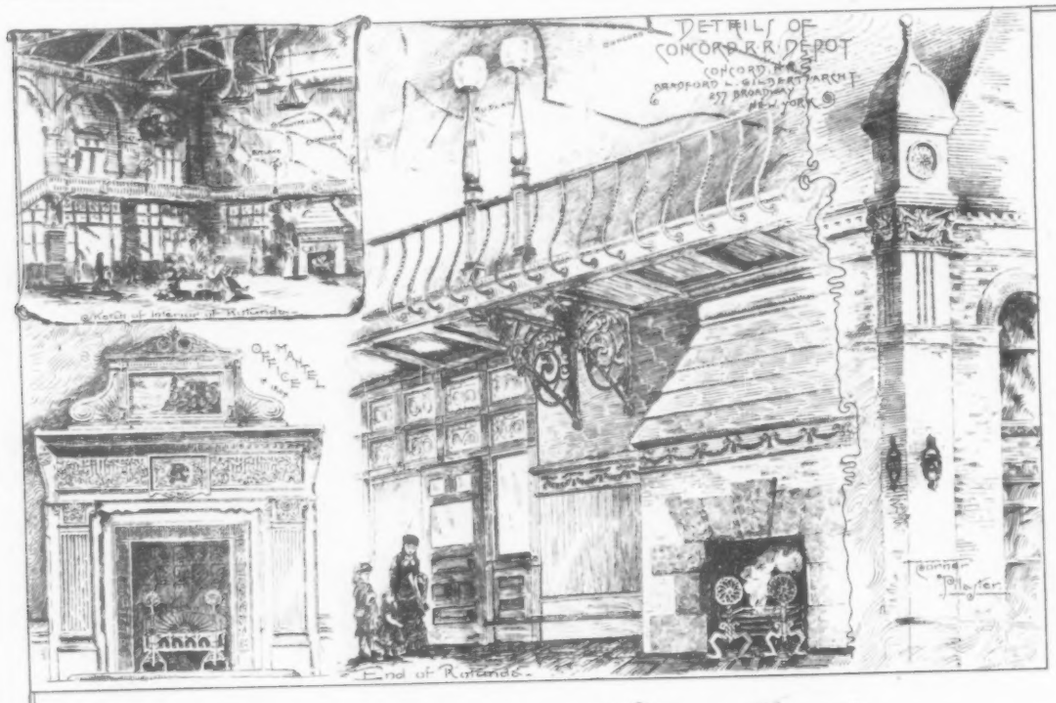
Stable at Cambridge, Mass.

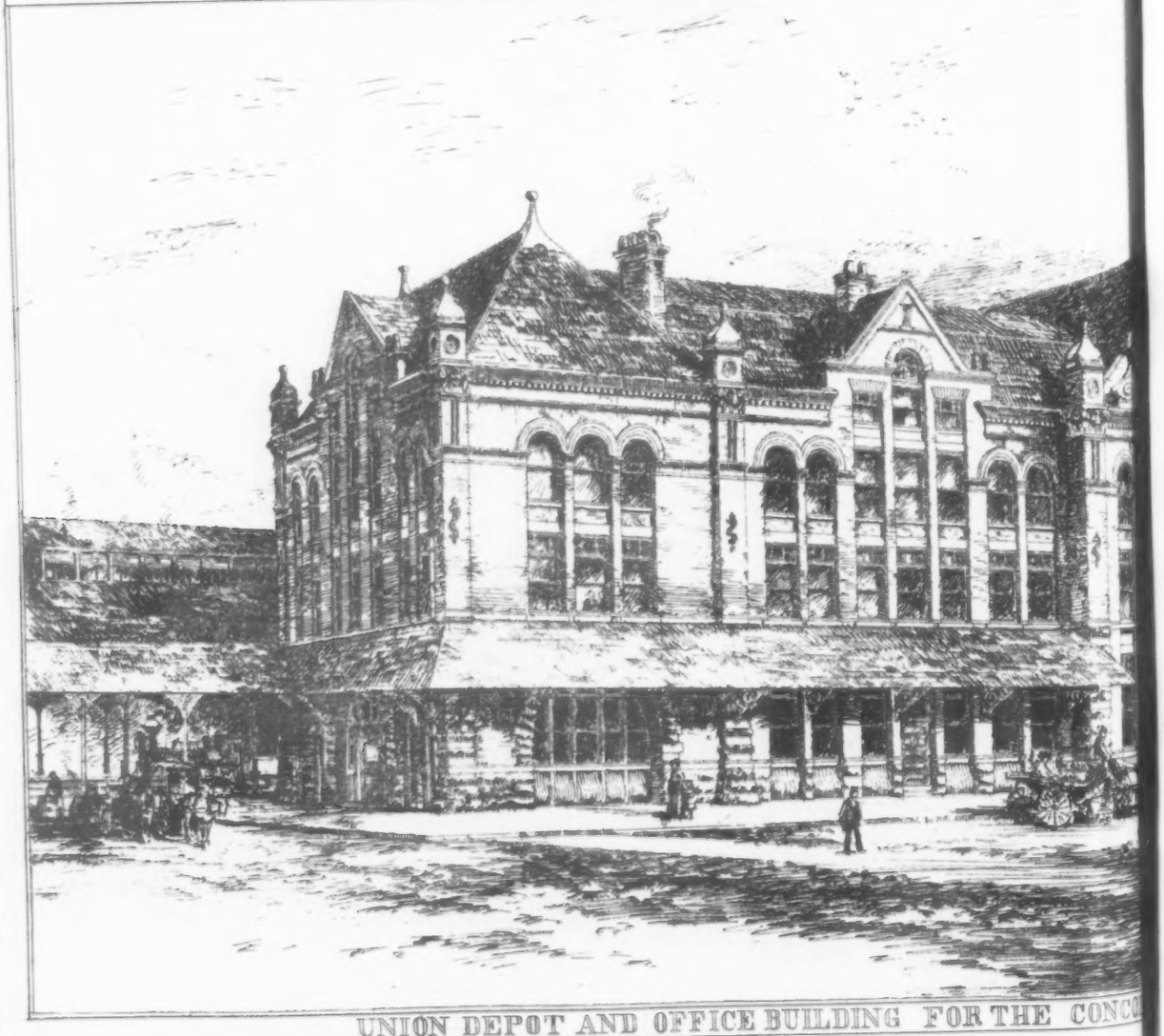
Cabot and Chandler, Architects.

HOUSE DESIGNED BY CABOT AND CHANDLER, ARCH'TS.

HELIOTYPE PRINTING CO. BOSTON

COPYRIGHTED





UNION DEPOT AND OFFICE BUILDING FOR THE CONCO

COPYRIGHTED 1885 JAMES R. OSGOOD & CO

Workingmens' Cottages in the Cités Ouvrieres ~
~ Mülhausen ~ Alsace ~

Sketched by C.H. Blackall ~

HELIOTYPE PRINTING CO. BOSTON

60′ x 40′), is a map in outline of the Concord Railroad and connecting lines. The roof trusses, exposed to view, are of oak, and a special system of ventilation has been provided in the upper ceiling. The finish of the walls is in rough stucco plastering. On all floors, open fireplaces, wash-basins, radiators, electric-bells, speaking-tubes, and all improvements are provided, as well as thorough sanitary plumbing. North of the rotunda, on the ground floor, is provided the restaurant, with kitchen and pantries complete; also, the Boston, Concord & Montreal Railroad office, and a conductors' room. At the extreme north end are telegraph and express office facilities, and a large fire-proof storage vault. On the first story in each wing are the general offices. In the second and third stories ample space is arranged for the freight office, clerks, engineers' offices, etc.

HOUSE AND STABLE, CAMBRIDGE, MASS. MESSRS. CABOT & CHANDLER, ARCHITECTS, BOSTON, MASS.

WORKMEN'S COTTAGES, MULHAUSEN, ALSACE, GERMANY. SKETCHED BY MR. C. H. BLACKALL.

For descriptions see article elsewhere in this issue.

RAILROAD STATION, DEDHAM, MASS. MESSRS. STURGIS & BRIGHAM, ARCHITECTS, BOSTON, MASS.

DESIGNS FOR STAINED-GLASS WINDOWS, BY MESSRS. J. & R. LAMB, NEW YORK, N. Y.

FARM BUILDINGS.[1]

THE first point to consider in fixing the site of almost any building in a country district is the water-supply, and for farming purposes it is most important that a plentiful supply should be obtainable close at hand. In theory, also, it is best that the buildings should be as nearly as possible in the centre of the holding; but in practice I find that the farmers as a rule prefer to have their houses and home buildings as near to a village as they can be got. On any holding above four hundred acres, then, the stock-yards, etc., should at any rate be on the farm itself, and a foreman's cottage should be close at hand. The position of the main roads must be carefully studied, and the easiest access to railway stations considered, the cost of transport being one of the largest items of expenditure in outlying districts. Having satisfactorily settled the site, the next point to consider is, whether there shall be one, two, or more stock-yards. For holdings up to five hundred acres, two yards will as a rule suffice; but it is best, if the funds at the architect's disposal will allow of it, always to give two, and as far as possible to separate the yards thoroughly.

Having arranged the yards, the next point to take into consideration is the aspect; and it is most essential to place the buildings so in relation to the crew-yards that the stock fattening shall get the benefit of all the sun that can be obtained, and also should be sheltered from the cold winds by the buildings. The buildings should, therefore, be on the northern and eastern sides of the yards, and the sides to the south and west left open. The level of the yard should be about two feet below the level of the stable pavement, and should be made as impervious as possible by well ramming and clay puddling so as to keep the straw bedding, etc., in the yard as "good" as possible. In the yards provision should be made for drinking-water for the stock, and if this can be running water so much the better; for an overflow pipe to keep the yard sufficiently drained is a necessity. In disposing the various buildings round the yards, it is best to place the following within easy distance of the farmer's house or bailiff's cottage; the nag-stable, gig-house, and harness-room, the calf-house, and the infirmary box. The first for convenience by day, and the latter by night, as occasion may rise, when it will be important to watch a cow or mare, or to feed the calves by hand, and a dry way of access to them is a good thing. It is a fault on the right side to make both the gig-house and the harness-room larger than the uses indicated by their names would imply. As the gig-house becomes generally a storage place for all sorts of odds and ends, from a sack of potatoes to empty bottles; and in the harness-room the odd boy about the place cleans the boots, oils the gun, and reads the local weekly paper on Sunday afternoon. About eighteen feet by fourteen feet is a good average size for the gig-house, and about half that size for the harness-room. A small loft is usually arranged over, in which a small supply of corn is kept, along with apples. Taking the buildings in rotation, we next come to the calf-house, which in an ordinary way, is simply a large box, about eighteen feet square, with a low manger on three sides divided up by wooden palings into pens of about six feet square. In larger buildings it will sometimes form a detached building with, perhaps, a tramway running down the centre for convenience of feeding, with the pens on each side, and a gangway all around of about four feet. With this arrangement the floor is sometimes sunk about two feet six inches, and I have seen a very simple and ingenious contrivance for altering the height of the manger daily as the bedding gradually becomes raised, so that the calves can get at their food without difficulty, but an ordinary iron trough answers all practical purposes. The internal temperature of the calf-house should be kept as even as possible, and it is better to build them with hollow walls.

I need not add that no loft for hay or any other fodder should be placed over any cow-shed or similar building, as the hay is not by any means improved by the exhalations of the cattle, and the risk of fire is intensified. The most impervious floor is the best, and I advise any of the many forms of Portland-cement concrete, whether called Granolithic, Imperial stone, or Wilkinson's patent concrete is immaterial, so long as the cement is really good and the granite chips and shingle clean. I can speak in high terms of Wilkinson's work from practical experience.

The cow-house may next be described. It is a great point here, as well as in the calf-house and stable, to insure an equal temperature and perfect ventilation. Where the buildings are of brick, hollow walls will be of great assistance, care being taken to have a thoroughly effectual damp-course of slates in cement, and two or three courses of brickwork, also cemented under, to keep out the mice and rats, the great enemies of the farmer as far as his buildings are concerned. The usual width of a cow-house is about eighteen feet; this allows of a feeding-passage at the back of the manger of four feet. The floor should slope very slightly toward the heels of the cows, and there should then be a drop of four inches into a surface-gutter, about one foot six inches wide, and the remainder will form the usual gangway. It is not necessary to divide the building up into stalls, but it is better to do so at the manger. This is done in the simplest way with oak paling. The mangers should be constructed of some hard and impervious material. There are very good purposely-made glazed terra-cotta bricks for this purpose. Hard, blue Staffordshire bricks also do very well; but one of the simplest and best mangers is formed by using the large-sized half-pipes of glazed stoneware used for drainage works, bedded on concrete, and having an oak capping. The joints are fewer and easier made than with the other materials mentioned. I am referring more particularly to home-made fittings, in contradistinction to the iron fittings manufactured by those firms who devote their energies to stable-fittings. The cost of these would be more than the ordinary buildings would carry; although for dairy farms, and in those establishments of a more or less show character, they are very effective. But the strongest fittings, and those which are least likely to cost money in repairs or to need repairs, are those best suited to the farmer. Again, the simplest methods of ventilation are the best; and the system I recommend is to carry up a large trough of wood, about two feet six inches broad at the base, gradually decreasing to about one foot three inches at the outlet, and having a plain cap at the top. The sides should be formed in two thicknesses, and the space between filled with sawdust. Sufficient air will find its way in by the door and windows to thoroughly change the air in a very short time. One ventilator in about every fifteen feet of length will suffice. The doors of a cow-house should always open outwards, and should not be less than four feet wide; four feet six inches is a better width, and sliding doors are best. But here, again, the question of cost will probably intervene. It is better, if possible, to use nothing in the way of hinges or bolts, etc., except the strongest, and those only that can be made or repaired, if necessary, by the village smith. Avoid complicated patents.

The windows should be placed at such a height that if the upper portion is glazed it cannot be reached by the horns of the stock in the yards. The old-fashioned hit-and-miss window, strongly made in wood, is as good as anything, and if with a small quantity of glass over, will answer every purpose. Where the glass is omitted in the windows, a few glass slates or tiles in the roof will be of use. Cast-iron hit-and-miss windows can be obtained from many founders. The cost of one, three feet six inches by two feet six inches, will be about 25*s*., list price. In the stable the stall divisions, which should be about nine feet deep, should be six feet three inches apart, centre to centre, and should be thoroughly strong; the mangers should be much as described for the cow-house; but one must bear in mind that the horse is rather a dainty feeder and has a very strong objection to dirt. Therefore, to avoid waste, it is a good thing to have the mangers of some materials easily kept clean, and here, again, any strong glazed ware will be found the best. A cart-horse stable should be, at least, eighteen feet wide, and that dimension is quite sufficient. But it must be borne in mind that the harness, etc., is frequently kept in the stable (although this is a bad thing to do), and provision should be made for, at any rate, temporarily placing the saddles, etc., on rests until they can be put away in the gear-house. As regards ventilation, the same as described for the cow-house will answer admirably. But avoid, if possible, any cross draughts, and if you are obliged, as may sometimes happen, to put either windows or ventilators in the same side as the mangers, keep them as high as possible.

[1] A paper read by Arthur Young, before the London Architectural Association, February 6, 1885, and published in *The Building News*.

The horses are usually brought into the stables reeking hot from ploughing or other work in the winter, and would then be particularly susceptible to cold. I do not think, even in the best stables, it is a good thing to lay on water to the drinking-pot forming part of some iron mangers. A horse will drink with much greater zest from a freshly-drawn bucket of clear water than from a slimy trough that may have been standing for days, and it is more natural for a horse to drink from the ground level, and not from a raised trough; he can get his nose much better into the bucket. If you are compelled, from motives of economy or want of space, to place lofts for hay or corn over the stable (only do so when you are absolutely obliged), be sure and have the loft-floor of cement.

The old plaster floors cannot be beaten for this purpose, as they are rather warmer than a Portland cement concrete; but in ordinary farm buildings it will rarely happen that you will have to place lofts over any of the buildings; but in hunting stables, and those attached to country houses the architect is obliged to put his lofts on the upper floor, and this arrangement has many conveniences; but, wherever possible, put lofts over coach-houses, harness-rooms, etc., and only put a passage for service over the stable. I fancy, as a rough rule in large stables, about half of the superficial area of the stable would give the requisite amount of floor-space for the lofts. It is a good thing, where mice are very destructive, to cover the floor and line the walls with thin zinc. The harness and gear house should be placed as near to the stable as possible, and should be about eight feet wide, and should have a fire-opening and flue, as here the farm laborers who are not boarded occasionally sit to take their "bit on the thumb," and it is frequently useful to be able to make up a fire quickly to heat a bran-mash or boil food for the pigs; and a fireplace here saves a journey to, and gossip in, the farm kitchen. Harness fittings should be of the strongest and rudest description; there is nothing better than strong oak pegs, built well into the wall. The gear-house should have a good-sized window. A small space should also be provided for storing, under lock and key, artificial manures and oil-cake. The floor of this department should be of wood, with about half an inch between each board, and plenty of ventilation under, as oil-cake very quickly gets mouldy, and requires to be kept in a dry and well-ventilated place. Between the stable and the cow-house is the best situation for the root and chaff cutting place; in small farms, an area about twelve feet by eighteen feet will do, but in larger ones these dimensions should be increased. As the roots will probably be stacked and bedded on the opposite side of the stable range to the crew-yard, it is necessary to have a door at both ends of the building. In the ordinary way, of course, the machines will be worked by hand; but on large farms, and in other cases where steam power is used for other purposes, the chaff-cutting, pulping, etc., will be done by steam power. In this set of buildings the same engine, one of about ten-horse power, drives the sawing-machines, and also does the chaff and root cutting, etc., the gearing being interchangeable. The barn is now built very much smaller than used to be the case. Unfortunately in recent years the farmer has been only too anxious to get his corn thrashed and sold, and there has been little use made of the barn for long storing — thirty-five feet to fifty feet by twenty feet will nowadays be considered a good barn. It is usual to put the doors of such size that a wagon can be driven through it, and about a third of the barn has a sort of loft over. Cement makes the best floor, and it is a good thing to render the walls in cement for about five feet in height all round. Sufficient ventilation is gained by putting a few air-slits, which should be covered with bird-netting to keep out intrusive sparrows. I have now taken you round most of the buildings, and there remain only to describe the open sheds for various purposes and the piggeries. Open sheds are required first in the crew-yards, for the protection of the fattening stock, and next for the covering of the various implements, wagons, and carts. The construction of them all is similar on three sides, inclosed by walls, and open on the fourth. On the open sides the roof should be supported by story posts of wood or iron, and these should be placed on stone bases. The top of the stone base should be about one foot above the level of the paving of the yard, to keep the wood or iron post away from the damp bedding laid down for the beasts. Great care should be taken with the principal trusses of the sheds, as, indeed, throughout farm buildings, and I think that on the whole the queen-post truss is the best one to adopt; and it is a good point to make the tie-beams deeper and stronger than usual, as the principals will most likely be called upon to carry the ladders, sheep trays, and all sorts of poles, etc., that are wanted out of the way. While the sheds should get all the sun possible, so the south-east is the best aspect for them; with the cart and implement shed the reverse is the case, as they should be sheltered as much as possible from the sun, and also from the rainy quarter, which in most English districts is the south-west; so that the best position for the cart shed is facing north-east. It should also be on the main farm road if possible. About fifteen feet is a good depth for these sheds. In many cases an additional useful room could be obtained for standing implements by bringing down the eaves of the barn to take anything not finding sufficient length of room in the cart shed. This would be cheaper than increasing the width of the shed throughout. An important point is to get a good isolated infirmary box. This should be about fourteen feet square, and as much apart from the other stables, etc., as the yard will allow; but should be within easy reach of the farm-house.

Over the infirmary box in the buildings shown on the wall, I have arranged the pigeon-cot, or dove-'us, as it is called in Northamptonshire. The great point in arranging a dove-'us is to provide plenty of nests, and in building with brick this is easily done. The plan of the nest is this: A table in the centre, a looking-glass, and a good lump of salt, complete the furniture of the most improved pigeon-cot. It is a good thing not to put an external door, as the pigeons are easily stolen by putting a net over the pigeon-holes and then rattling the doors, which startles the birds, driving them into the nets. Of course this applies more particularly to those detached buildings at some little distance from the house. As to the question of laborers' cottages and working portions of the farm-houses, the item of cost is the great one that requires attention, and the points for us, as architects, to consider how best we can build the most durable buildings, leaving to the farmer and land agent to give us in each case the particular requirements, and having obtained from them the number of horses likely to be required on the farm, and the number of cattle kept, then to give them necessary accommodation, and to do this always with the materials ready to our hands. I am having continually impressed upon me that the cost of buildings erected recently is really greater than the land can bear, and that we ought to turn our attention to devising, if it be possible, cheaper modes of construction. I am of opinion that farm premises might be cheaply erected in concrete in many districts. Then the question of roofing material is also a most important one. Galvanized iron is recommended by many as the coming material. I cannot say that I have yet seen it introduced in an architectural manner; and it seems to me lacking in the first essential for roofing material — durability. It will do admirably for open barns and in similar positions, but how long will it last, water-tight, without painting? Not quite long enough to repay the first cost, I am afraid. We have a difficult problem to work out. Let us do it well — with beauty, if possible — but always with truth.

HEATING GREENHOUSES.

Woodlands Hall England

AT the weekly meeting of the Massachusetts Horticultural Society, which was held Saturday, March 21, Mr. J. H. Woodford read a paper on the subject of "Heating Greenhouses." He said that he knew of only two horticulturists who are trying to improve their heating-apparatus by their own handiwork, and what they are trying for is simplicity of construction, economy of fuel, and at the same time efficiency. In the one case a bank of horizontal pipes surmounted by a coil of pipes and all surrounded by brickwork does good service, but at the expense of great waste of heat, which passes away up chimney, and ought not to be allowed to escape without doing service. This waste heat might be used in heating the water used in watering the plants by placing in the chimney, in such a manner as not to interfere with the draught, a stack of pipe through which the water should pass before using. This would be economy in the use of fuel, for we all know that great quantities of heat pass off up chimney, which does no work and is wasted. Some authorities who have looked into this important subject pretend to say that half of all the heat generated in or under the best of our horticultural heating-apparatus passes off without doing any good except to help to heat up all outdoors. If we could build a fire which would last all night, and at the same time be of such intensity as just sufficient to properly heat the water in our boiler, then there would not be any appreciable waste of heat. But as this cannot be done, the question comes up what can be done with the heat after it has done its work under the boiler and is on its way up chimney. If one cannot use this waste heat in any other way, it would be well to use a coil of pipe in the chimney, where forced water is used, for all the water passing through it would become warmed to such a degree as to make it much more acceptable to growing plants than cold water direct from the service-pipes or cistern. A gentleman has built with his own hands a bank of pipe with the ends built with the surrounding brickwork and a fire-box underneath. The construction is faulty. On the top of the brickwork he has enclosed another space through which he carries the water-pipe to irrigate his growing crops. No doubt but this last will be beneficial, but by this process he does not utilize the waste heat, but is drawing constantly from the heated furnace. He could get better results by carrying the irrigating water through a coil of pipes in the chimney. We all know that the temperature of a greenhouse can readily be reduced and the growth of plants badly checked by the promiscuous introduction of

cold water, and therefore we see the necessity of providing an economical means of supplying only warm water to growing plants.

A greenhouse heater should be constructed on scientific principles, such as adaptability for the purpose for which it is intended, simplicity of construction, and the easy way in which to get at it for cleaning and repairs. Under the first proposition we will say that heating greenhouses by hot water or steam are now conceded to be the best methods in use, and now comes the vital question: How can we heat water the most economically, either to circulate through the pipes as water or as steam, and the most expeditiously? Shall we continue blindly to use those boilers which are constructed in such a manner as to present to the fire a great mass of water in one solid body to be heated, or shall our boiler be constructed of pipes, whereby the same body of water shall be exposed to the warming influence in small streams and in the same space?

The same fire will heat water much hotter when it passes through tubes in a boiler than when we have a great mass of water presented to the fire at one time. The plan should be to have the water come under the influence of the fire in small, continuous bodies, so as to utilize the heat as much as possible before it passes away. The speaker here illustrated by means of diagrams the details of his plan of boiler construction. He said that the hotter the water can be made in confinement the faster it will travel through the pipes, and in this way only can a large space be heated, either by hot water or steam. The construction can be very simple, and not expensive; a bank of one-and-one-half-inch pipe occupying a space five feet long, two feet high, and two feet wide, divided in the middle by tiles, so that the heat from the fire built under one end shall pass through the bank twice before reaching the chimney; and the bank of pipe inclosed in brickwork, the top of the brickwork resting on gas-pipe, the whole of which should project into the greenhouse, thereby saving all the heat radiated from the furnace. The feed-door should be outside, to prevent coal-gas from entering the greenhouse while stoking. This plan will make a fire-box two feet wide by two feet long, which should be of sufficient capacity to heat a greenhouse twenty feet wide by one hundred feet long. The water will pass in at the bottom of the bank of pipes and out at the top, thus being in one continuous stream of one hundred feet long through the bank of pipes, thereby heating it quickly.

The flow of water in one stream through such a length of pipe one hundred fe ', and over a live fire, ought to heat the water very hot in a short s, .ce of time, thereby causing it to flow through the radiating pipes with such velocity as to cause its return to the boiler before it loses its heat. This is the great secret of successful heating, by which we shall not require such large radiating pipes as four inches diameter to heat our greenhouses, nor so many of them, for what we require to properly do the work will be kept very hot the entire length, by the constant and expeditious passing of hot water through the fire in one continuous small stream. The flow-pipe should be constructed in such a manner, as it passes from the boiler, to immediately empty itself into a stand or expansion pipe near the boiler, and on top of this stand-pipe we should have a valve which would withstand a pressure in case of the great heat in the water inducing steam. The stand-pipe can be placed in such a position in the greenhouse, and the flow taken from it at such a depression as to preclude the necessity of placing the boiler below the level of the surface of the soil in the greenhouse. The chimney should receive the smoke on a level or lower down than the grate, so that all the gases from the coal will be consumed over the fire and among the pipes constituting the boiler. — *Boston Journal.*

A QUESTION ON FLUES.

Sandusky, O., March 25, 1885.

To the Editors of the American Architect: —

Dear Sirs, — Having read a good deal about ventilation, and finding practice quite different from theory in some cases, you will allow me to ask the following question through your valuable paper, namely: What will be the general result, if the furnace, grate and ventilating flues of say a three-story building, are run up separate to the ceiling of the last floor, and then all flues unite in one? Will some ventilator please inform Ignorance.

[In mild weather some smoke from the range flue would be likely to creep down the ventilating flues. — Eds. American Architect.]

COMPETITIONS.

Boston, March 29, 1885.

To the Editors of the American Architect: —

Dear Sirs, — I should judge that your correspondent, "Clef," was a person of slight imaginative faculty, for he seems quite unable to perceive the bearing of the several suppositions I recently advanced; therefore I will not put forward any others, but will reply briefly to his letter in your issue of yesterday by saying: —

First, that I did not suggest the inference that "every one is an equally competent judge in matters of taste," but I will accept the inference with the interpolation of the words "thinks he" after the words "every one."

Next, I did not confine my promenade amongst tailors to the "well-known" Snips alone. My only object was to get my suit built according to my own taste, — and I succeeded.

Next, if legal competitions such as I invented had had actual existence, they would not have been mentioned, and "Clef" could not then have overlooked the point that my dubitation concerned not the manner in which such competitions would be held, but whether, there being such competitions, lawyers would or would not take part in them.

The scheme I suggested, and which you have thought well enough of to try to put in practice, was not presented as the best that could be devised, for it had not occurred to me when I began to write; but I do think it is a reasonable way of securing a certain measure of improvement in this much-vexed matter.

Very truly yours, W.

Columbus, O., March 26, 1885.

To the Editors of the American Architect: —

Dear Sirs, — In your journal of the 14th you urge each of your readers to write to you concerning your proposed change in terms of the competition for Richmond City-Hall.

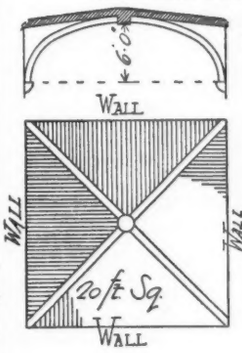
Before expressing an opinion, I desire to be sure that I understand what kind of a competition it is you suggest, and not being able to satisfy myself from the pages of your paper, I ask, for information, the question: Is the competition to be limited to the "ten champions of reform," or is it to be open to all who desire to enter it?

If you will be kind enough to answer this question, I will be ready to say what I think of the "competition" you propose.

Respectfully yours, J. W. Yost.

[The competition we have suggested is intended to be open to all. The scheme, if accepted, will secure to the Richmond authorities ten designs of assured merit in addition to all the other designs which might be submitted. Moreover, on the reconstructed programme, a large number of designs of equal merit with those of the selected ten would probably be received. — Eds. American Architect.]

CENTRES FOR A GROINED VAULT.



Hartford, Conn, March 16, 1885.

To the Editors of the American Architect: —

Dear Sirs, — Will you be so kind as to describe in your valuable journal the method of laying out the centres for a groined vault; the diagonal ribs being a segmental arch, and the crown of the same 1′ 3″ higher than the crown of the side arches. There are to be no wall-ribs; the arches are of brick and the diagonal ribs of stone.

Respectfully,

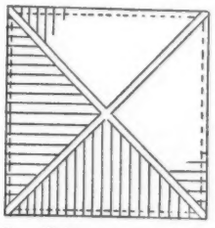
A. Vault.

Boston, March 19, 1885.

To the Editors of the American Architect: —

Dear Sirs, — It is assumed that the writer means the wooden *centre* for turning the vault on, and not the point from which to describe the arc.

Draw out the curve of the soffit on the wall side, and showing the section at the centre of the cross vault. Draw one-half plan, and from there work out by the principles of projection the form of the diagonal ribs. It will be elliptical in shape if the vaults are segmental. Having worked out by means of points the curve of the diagonal ribs, I would construct centres for these, with plank on each side, rising to the soffit of vault. Set these centres in place, and a centre for the wall sides, and connect these latter centres with the ribs by means of plank, as shown in sketch. The brick can then be laid on these. If the courses of brick are laid vertically, the soffit will be a succession of very slight steps, and if the courses are laid at right angles to the soffit, so as to make it true, it would probably improve the appearance to have wall-ribs. Very truly yours,



F. E. Kidder.

HAY-CHUTES.

Cleveland, O., March 23, 1885.

To the Editors of the American Architect: —

Gentlemen, — I have noticed in the criticisms of various plans submitted in your stable competition, that the jury seems to be strongly in favor of separate hay-chutes to each stall, and I write to see if they will be kind enough to give their reasons for the same.

My experience has been that it is better not to use them, because with them we must either with an open chute sprinkle hay-seed in the horse's face, or with a closed one use what I have heard called "starvation mangers," *i.e.*, the round iron corner rack at the bottom of the chute. The open chute in the aisle or passage makes the stable man more work, but it gives the horses a low open manger,

keeps their manes cleaner, and makes the man keep the stable neater. It is very seldom that we hear of an overworked stable man in these private city stables.

Hoping to hear some reasons on the other side, I remain

Very sincerely yours, Clarence O. Arey.

ECHO IN A ROOM.

Brooklyn, March 6, 1885.

To the Editors of the American Architect: —

Dear Sirs, — Can you inform me, in the *American Architect*, of some simple and inexpensive method to overcome an echo in a room to be used for singing purposes, but used generally as a dancing-room, not carpeted. The room is forty-five feet by eighty-five feet, and twenty-eight feet high to ceiling, which is flat, but with a five-foot cove underneath it, extending entirely around the room.

The floor is laid on sleepers attached to iron beams, and the ceiling is on wire-lath, — iron meshing attached to iron purlins.

Respectfully, Mercein Thomas.

[We should be inclined to try first the effect of hanging cloth all around the room, over about two-thirds the height of the wall. It would look best, and probably be most effectual, to stretch the cloth, which might be any light cotton or woollen material, on frames, with a small moulding at top and bottom, so as to form a band extending from the dado, if there be one, to within a few feet of the cornice. This would correct what is probably the main defect of the room, the hardness of the wall surfaces, and would tend, also, by introducing strong horizontal lines, to overcome the want of proportion between the width and height. If an echo from the ceiling should still remain, it may be dealt with by decorating it with cloth in the same manner.—Eds. American Architect.]

MEDIÆVAL.

Kansas City, Mo.

To the Editors of the American Architect: —

Dear Sirs, — Can you inform me through your valuable paper the meaning of mediæval, a word I frequently meet with in architectural books, and oblige Yours, etc., J. G. B.

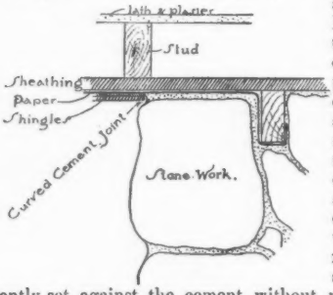
["Mediæval" is an adjective qualificative of nouns which have reference to the Middle Ages. The Middle Ages are often considered the centuries elapsing between the Fall of the Western Empire, A.D., 476, and the discovery of America in 1492; but as the world was expected to come to an end in the year 1000, and people with this expectation before them had become unprogressive and degraded, the period between 476 and 1000 is usually styled the Dark Ages; so that practically the word mediæval is generally used in speaking of the period between 500 and 1500.—Eds. American Architect.]

A CORRECTION.

St. Paul, Minn., March 18, 1885.

To the Editors of the American Architect: —

Dear Sirs, — Permit me to correct a mistake made by your draughtsman in reproducing my sketch of the junction of a wood and a stone wall in house at Dellwood, as published in the magazine March 14. My original sketch, as per letter-press copy, shows a curved cement joint for edges of shingles to butt against, as shown in accompanying sketch. The sketch as redrawn and published, as above, represents the cement carried back of shingles, without the necessary furring to lath against, and showing the shingles apparently set against the cement without nailings, which would be an impossibility in this work, besides not being at all what was really done. The error was probably caused by a blur on my drawing, made in taking a letter-press copy, which obscured the drawing at the point in question.



I am confident that you will permit me this correction, though it is so small a matter. Yours respectfully,

Cass Gilbert.

NOTES AND CLIPPINGS.

Preserving Timber. — About five years ago the chemist of a corporation in the United States, wishing to preserve shingles against decay, and also render them incombustible, impregnated them with lime and salt, by boiling them in a solution of ten pounds of salt and twenty pounds of lime with two hundred and fifty gallons (twenty-five hundred pounds) water. Ten bundles of shingles were boiled until thoroughly saturated, the process costing fifty cents per thousand shingles. These prepared shingles have been used for roofing purposes, both with and without the protection afforded by paint, and the result has proved in every way satisfactory. Recently some prepared shingles were subjected to trials in competition with ordinary shingles. They were dipped into naphtha and lighted, the ordinary shingle burning until consumed, while the flame on the prepared shingle went out as soon as the naphtha was burned, and without igniting the shingle. A spark test made by a burning mixture of charcoal, sulphur, and saltpetre on the shingles, burned the ordinary shingles, but only charred those which were prepared. Exposure to gas flames showed similar resistance to combustion in the prepared shingles. The antiseptic properties of lime upon wood and iron are well known, the only element of uncertainty being the rate at which such lime and salt deposits in the pores of the wood would be removed by rain storms. The experience of five years shows that this decrease is a slow one, and may be retarded by paint. It is considered that such preparations may be applied more thoroughly to green lumber where the sap cells are still open and capable of absorbing moisture than in seasoned stock, which cannot have so much permeability. — *Engineering.*

A Canadian on American Architecture. — The Montreal *Witness* pays this tribute to the progress in architecture in this country: "The United States is soon going to take the lead of older countries in the matter of modern architecture, as it is natural that it should. A rapidly developing country, constantly requiring new conveniences, offers the most promising field for the ablest men of the age, and scarce a week passes that the American illustrated papers are not adorned with pictures of some new public building, grand in extent, of original design and of surpassing beauty. The young Western cities which have sprung up within the æsthetic era are fairy lands as compared with the new towns of thirty years ago."

Cost of Purchases for the National Gallery for Twenty-four Years. — A Parliamentary return has been issued showing the sums expended by the Trustees of the National Gallery in each year from 1860 to 1884 inclusive, from moneys provided by Parliament in the purchase of pictures. The total sum so expended during that period has been £250,100. Apart from the years 1871-2 and 1872-3, the returns for which are *nil*, the smallest amount expended in any one year was £350 (1877-8) and the largest £76,500 (1870-1). This is by a long way the largest sum spent in any year embraced in the return, the nearest approach to it being £25,299 in 1882-83. The figures for other years vary from £2,819 to £16,678. During the period mentioned, no single picture was purchased for a sum of or exceeding £10,000, but the following prices above that amount have been paid for groups of pictures purchased at the same time out of one collection: £75,000 for 77 pictures and 13 drawings purchased from Sir Robert Peel's collection in 1870-1, £10,395 for 13 pictures from the Barker collection in 1874-5, and £21,042 for 10 pictures from the Duke of Hamilton's collection in 1882-3. — *N. Y. Evening Post.*

Gaseous Fuel. — A correspondent of a Yorkshire paper discusses a practically illimitable sphere of work for gas companies. Living in a district where tall chimneys incessantly obscure the sky with clouds of black smoke, it has occurred to him that th s horrible pall represents an immense waste of heat as well as of fuel. The bigger the chimney, the more heat is drawn up by it from the fire or furnace beneath, and the whole volume of this caloric is absolutely wasted. But if gaseous fuel were used instead of solid, there would be no smoke, therefore no need of chimneys great or little, and consequently the whole heat generated could be utilized. It is further claimed that boilers would last much longer, and that the cost would be less by one-fourth. Unfortunately, those who have had practical experience with the two sorts of fuel unanimously declare that gas, while very much to be preferred for cleanliness and convenience, is much more expensive. It is possible, however, that the companies could manufacture a less costly article for this purpose than they now purvey for illumination. — *N. Y. Evening Post.*

The African Inland Sea. — A party of French Engineers and hydrographers has left for Tunis, charged with making the necessary studies on the spot, for the construction of the harbor in the Bay of Gabes, at the mouth of the Oued Mellah, in connection with the canal which is to establish navigable communication between the Mediterranean and the Chotts. It will be remembered that, in the early spring of 1883, M. de Lesseps made a trip to those great marsh lakes in Southern Tunis, which it is the intention to convert into a vast inland sea, with a view of testing the results of the late Colonel Roudaire's survey, and that he came back convinced that the scheme was practicable. The expedition which has now started will also make investigations as to the feasibility of sinking artesian wells along the route, and the survey for a railway which it might hereafter be thought necessary to construct. The head of the expedition is Commandant Landas, Professor of Topography at the school of Saint Cyr. He is accompanied by M. Baronnet, who assisted Colonel Roudaire in making the preliminary surveys, and several other engineers. It may be advisable to recall to mind the chief features of the report on the undertaking which M. de Lesseps published after his return from Tunis in 1883. It states that the estuary of the Oued Mellah, which is to be the beginning of the canal leading to the Chotts to be inundated, offers a part, covered at high water, of sufficient breadth which might easily be excavated, and would form a part sheltered by nature from all the winds from north-east to south passing by the west. The winds from northeast to south passing by the east would not be dangerous to the breakwaters. The roads in front of the entrance are, moreover, in exactly the same situation as those of Gabes. The navigation in the canal, according to the report, would offer no difficulty, as the canal would form almost a straight line. The calcareous rocks found by Colonel Roudaire's soundings in 1879 at the base of the Gabes bar, but of comparatively unimportant extent, are an advantage rather than an inconvenience at the mouth of the canal. They will furnish the requisite material for the construction of the pier and port buildings. M. de Lesseps thinks that, considering the nature of the soil traversed, it will be sufficient to cut, in the alluvial part, a canal, on the average 80 to 100 feet wide, which will be further widened by the action of the current. This cutting could be executed in the maximum period of five years, at an estimated cost of £6,000,000. The proposed inland sea would be fifteen times as large as the Lake of Geneva. It has an elevation much lower than the level of the Mediterranean, the depression being in some places as low as 165 feet below that level. — *London Iron.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

313,844. COMBINED SCREEN AND STORM-DOOR. — Charles Anderson, Downer's Grove, Ill.

313,852-853. ROOFING FINISHING. — Lewis D. Cortright, Hyde Park, Ill.

313,859. BLIND-TENON. — John Forhan, New York, N. Y.

313,865. VENTILATING-LOUVRE. — George Haven, New York, N. Y.

313,867. TANK. — Elijah Hines, Batavia, Ill.

313,876. REFRIGERATOR-DOOR. — George A. McArthur, Pullman, Ill.

313,883. STEAM-RADIATOR. — Leon H. Prentice, Waukegan, Ill.

313,887. ELEVATOR. — George H. Roehm, Dayton, O.

313,888. LOCK-BOLT FOR DOORS. — John B. Schroder, Cincinnati, O.

313,913. APPARATUS FOR TREATING, SEASONING AND PRESERVING TIMBER. — John B. Blythe, Bordeaux, France.

313,919. BLIND-SLAT FASTENING. — Eben M. Coffin, Hubbardston, Mass.

313,921. WEATHER-STRIP. — John Cortrell, Schell City, Mo.

313,930. BRICK FOR VENEERING FRAME HOUSES AND OTHER WOODEN BUILDINGS. — Millard F. Ellis, Atchison, Kans.

313,941. ELECTRIC BELL. — Charles E. Kells, Jr., New Orleans, Kans.

313,942. BAR FOR SECURING DOORS AND SHUTTERS. — Charles H. Knauer, Phœnixville, Pa.

313,943. BENCH-DOG. — Martin J. Kugler, Barnesville, O.

313,950. BIT-BRACE. — Johannes T. Pedersen, Brooklyn, N. Y.

313,971. FIRE-PROOF COMPOSITE ROOF. — Thomas H. White, St. Louis, Mo.

313,998. HOT-AIR GENERATOR FOR FIREPLACES. — Jesse S. Deardorff, Canal Dover, O.

314,005. HANGING DOOR. — Charles W. Emerson, Charlestown, Mass.

314,011. LOCK-MORTISING CHISEL. — Philo L. Fox, Bridgeport, Conn.

314,022. BRICK. — William Heard, Brooklyn, N.Y.

314,026. ILLUMINATING BASEMENTS. — Peter H. Jackson, San Francisco, Cal.

314,058. BENCH-HOOK. — Joseph B. Sargent, New Haven, Conn.

314,075. ASSEMBLING-BOLT. — J. Galusha Staunton, Ellicottville, N. Y.

314,076. ROOF. — J. Galusha Staunton, Ellicottville, N. Y.

314,105. HINGE-LOCK FOR SHUTTERS. — Serena M. Carnes, New York, N. Y.

314,114. MANUFACTURE AND PRESERVATION OF ARTICLES OF GYPSUM, STUCCO, OR THE LIKE. — Maximilian Dennstedt, Tzscheoheln-Niederlausitz, Prussia, Germany.

314,128. RADIATOR. — William Hopkins, Dubuque, Iowa.

314,145. WATER-CLOSET. — James Muirhead, Olneyville, R. I.

314,147. HASP-LOCK. — Charles Neblet, Cincinnati, Ohio.

314,162. SASH-FASTENER. — John Ashton, Philadelphia, Pa.

314,177. DOOR-HANGER. — George W. Hey, Syracuse, N. Y.

314,201. SASH-SUPPORTER. — Jason D. Simmons, Chicago, Ill.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report thirty-one permits have been granted, the more important of which are the following: —

W. H. Falconer, three-st'y brick building, s s Franklin St., between Greene and Paca Sts.

Chas. L. & J. S. Clark, 5 three-st'y brick buildings, w s Eden St., commencing cor. Oliver St.

P. McGuire, three-st'y brick building, e s Pine St., n of Baltimore St.

J. T. Grindall, 5 two-st'y brick buildings, e s Battery Ave., s of Fort Ave., and 6 two-st'y brick buildings, w s Battery Ave., s of Fort Ave.

C. J. Fox, 8 three-st'y brick buildings, e s John St., commencing s e cor. McMechen St.

J. H. Themeyer, three-st'y brick building, e s Caroline St., between Lancaster and Thames Sts.

Wm. Aimey; 19 two-st'y brick buildings, w s Hanover St., between Wells and Winder Sts.

D. E. Potter, 12 two-st'y brick buildings, e s Race St., commencing s e cor. Cross St.

Henry Cronhard, three-st'y brick building, s s Madison St., between Spring and Caroline Sts.

Boston Fear, 7 two-st'y brick buildings, s s Winchester St., w of Fremont St., and 8 two-st'y brick buildings in rear.

Boston.

BUILDING PERMITS. — *Wood.* — *Quincy St.*, cor. Blue Hill Ave. dwell., 25′ 6″ x 38′; Benjamin Pope, owner; Max Wiese, builder.

Tremlett St., cor. Washington St., dwell., 24′ x 36′; John French, owner and builder.

Fairview St., cor. Proctor St., dwell., 22′ x 32′; John Fraser, owner and builder.

East Chester Pk., junction Swett St., store, 36′ x 38′; J. McBarron, owner; James Hanning, builder.

Evans St., cor. Corbett St., dwell., 23′ 6″ x 32′; W. A. McAuley, owner and builder.

Sheridan Ave., No. 43, dwell., 24′ x 30′; T. B. Hall, owner; M. Sullivan, builder.

Brooks St., No. 22, dwell., 22′ 6″ x 36′; D. Murphy, owner; A. J. McLaven, builder.

Brooks St., No. 20, cor. Chelsea St., dwell., 22′ 6″ x 36′; D. Murphy, owner; A. J. McLaven, builder.

Dana Pl., dwell., 20′ x 40′; A. B. Pinkham, owner; Pinkham & Russell, builders.

Dana Pl., dwell., 20′ x 40′; C. A. Russell, owner; Pinkham & Russell; builders.

Bay St., near Regent St., dwell., 22′ x 40′; W. A. Whelan, owner; Pinkham & Russell, builders.

Brick. — Albany St., No. 157, dwell. and store, 19′ 6″ x 55′; Joseph Graham, owner and builder.

Middlesex St., Nos. 65-67, apartment-house, 24′ x 50′; N. & S. A. O. Sullivan, owners; Sullivan Bros., builders.

St. Botolph St., No. 117, dwell., 25′ x 64′; G. M. Gibson, owner; Thomas R. White, builder.

St. Botolph St., No. 119, dwell., 25′ x 64′; R. H. Allen, owner; Thomas R. White, builder.

St. Botolph St., Nos. 121-133, 7 dwells., 25′ x 64′; Z. N. Thompson, owner; Thomas R. White, builder.

Dover St., No. 68, cor. Shawmut Ave., dwell., 20′ 6″ x 58′; H. H. Fitch, owner; J. E. Potter, builder.

Dover St., cor. Hingham St., dwell., 24′ x 58′; Trustees; J. E. Potter, builder.

Brooklyn.

BUILDING PERMITS. — *Fifth Ave.*, w s, 25′ s Warren St., three-st'y brick store and tenement, tin roof, wooden cornice; cost, $7,000; owner, Wm. H. Chubb, 430 Wyckoff St.; architect, C. Werner.

Woodbine St., n s, 125′ w Evergreen Ave., 2 two-st'y frame dwells. (brick-filled), tin roof; cost, $3,000; owner, architect and builder, Frederick Marryatt, 77 Woodbine St.

Greene Ave., s s, 300′ w Tompkins Ave., 5 three-st'y brown-stone dwells., tin roofs; cost, $6,000; owner and builder, R. C. Addy, 592 Willoughby Ave.

De Kalb Ave, n s, 222′ 8″ w Myrtle Ave., 2 two-sty, frame dwells. (brick-filled), tin roof; cost, each, $1,800; owner and architect, James W. Lamb, 84 Bushwick Ave.; builder, A. J. Lamb.

Scholes St., No. 259, s s, 400′ e Bushwick Ave., three-st'y frame tenement (brick-filled), tin roof; cost, $4,000; owner and architect, Charles Mitchel, 256 Scholes St.; builders, C. Buchheit and C. Wiebauer.

Third Pl., n s, 161′ e Henry St., 4 three-st'y and basement brown-stone dwells., tin roofs; cost, each, $5,000; owners, John and Jas. Williamson, 23 and 25 Third Pl.; architect, M. J. Morrell; builder, P. J. Carlin; contractor not selected.

Clinton St., s w cor. Union St., 6 three-st'y Connecticut brown-stone dwells.; and *Union St.*, s s, 81′ 8″ w Clinton St., 2 three-st'y and basement Connecticut brown-stone dwells., tin roofs; cost, each, $6,500; owner, Julius Wadsworth, New York; architect and builder, George Lowden.

Dean St., s s, *No.* 1294, two-st'y and basement dwell., tin roof; cost, $4,500; owner, H. D. Eastman, 1292 Dean St.; architect, J. T. Miller; builder, W. W. Eastman.

Quincy St., s s, 293′ e Reid Ave., 2 two-st'y front and three-st'y rear brick dwells., tin roofs; cost, each, $4,500; owner, A. S. Walsh, 643 Madison St.; architect and builder, A. Miller.

Lexington Ave., s s, 100′ w Nostrand Ave., 18 two-st'y brick dwells., gravel and tin roofs; cost, about $4,200 each; owners, Jos. P. Puch and Wm. J. Northbridge, Lexington Ave., cor. Nostrand Ave.; architect, F. F. Jones; builders, Alex. Vanvorst and Young Bros.

Johnson Ave., Plank Road, s s, 125′ e old Bushwick Road, opposite L. I. R. R. freight depot, two-st'y frame storehouse, gravel roof; cost, $3,000; owners and architects, B. F. Conklin & Sons, Bushwick Ave., cor. Johnson Ave.; builders, J. Connor and J. Rueger.

Harrison Ave., No. 141, e s, 75′ s Gwinnett St., three-st'y frame store and tenement (brick-filled), tin roof; cost, $4,000; owner and builder, Adam Kessel, 143 Harrison Ave.; architect, Th. Engelhardt.

Broadway, e s, 33′ 1″ s Ewen St., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $10,000; owner, F. Wiesbrod, on premises; architect, Th. Engelhardt.

Duffield St., No. 43, four-st'y and basement brick tenement, tin roof; cost, $8,000; owners, Parfitt Bros., Garfield Building.

ALTERATIONS. — *De Kalb Ave.*, s s, 100′ e Bushwick Ave., three-st'y brick extension, tin roof; also, wood entrance taken down and rebuilt of terra-cotta; cost, $10,000; owners, Little Sisters of the Poor, De Kalb and Bushwick Aves.; architects, Parfitt Bros.; builders, E. T. Rutan and H. J. Brown.

Fulton St., Nos. 398-404, interior alterations; cost, $3,500; owner, John French, 469 Clinton Ave.; architect, John Mumford; builder, Cornelius Cameron.

Chicago.

BUILDING PERMITS. — V. Slapak, three-st'y store and flats, 362 Eighteenth St.; cost, $9,000.

T. Colbenson, three-st'y dwell., 52 West Ohio St.; cost, $2,800.

H. B. Koenig, three-st'y dwell., rear 177 Wells St.; cost, $3,500.

Sanders & Rejon, three-st'y dwell., 91 Howe St.; cost, $4,000; architect, H. Sanders.

W. H. Thomas & Son, 5 cottages, 1093-1103 Hoyne Ave.; cost, $6,000.

W. H. Thomas & Son, 7 cottages, 156-168 Moore St.; cost, $8,000.

M. Hoy, three-st'y store and dwell., 89 Thirteenth Pl.; cost, $3,500.

J. Baumeister, two-st'y dwell., 150 Newbery Ave.; cost, $2,500.

J. Peklo, three-st'y store and flats, 582 Blue Island Ave.; cost, $9,000.

C. Lassau, three-st'y store and flats, 962 West Twelfth St.; cost, $7,500.

C. Panfrau, three-st'y flats, 76 Wilson St.; cost, 5,000.

F. H. Bailey, two-st'y dwell., rear 292 West Jackson St.; cost, $4,000.

J. Brucha, three-st'y dwell., 467 West Nineteenth St.; cost, $3,500.

J. Better, two-st'y store and dwell., 667 Ogden Ave.; cost, $2,500.

O. Knudson, basement and rear addition, 159 Hubbard St.; cost, $10,000.

J. Andrin, two-st'y dwell., 395 Ontario St.; cost, $7,500; architect, J. Addison; builders, Barney & Rodatz.

P. Benz, two-st'y dwell., 235 Irving Pl.; cost, $2,700; architect, T. Karls.

W. H. Pruyne, two-st'y dwell., 447 West Congress St.; cost, $4,500; architects, Wilson & Moody.

J. A. Schuster, two-st'y flats, 265 Dayton St.; cost, 3,300.

F. Brenning, two-st'y store and dwell., 728 Clybourne Ave.; cost, $3,500.

T. W. Snell, two-st'y dwell., 244 Burling St.; cost, $2,500.

M. Olsen, two-st'y dwell., 440 West Division St.; cost, $3,000.

F. Posta, three-st'y store and dwell., 171 Dekoven St.; cost, $8,000.

Chicago White Lead and Oil Works, four-st'y warehouse, 45-47 North Green St.; cost, $30,000; architect, F. H. Waescher; builder, Geo. Hinchliff.

D. Jaeger, three-st'y store and dwell., 315 Johnson St.; cost, $4,000.

A. Lonne, two-st'y dwell., 655 Lincoln St.; cost, $4,000.

C. Splinter, basement, 103 Chicago Ave.; cost, $3,000.

H. J. Cobb, two-st'y dwell., 72 Belleview Ave.; cost, $10,000; architects, Cobb & Frost; builders, Augus & Gendele.

F. Stiba, two-st'y dwell., 29 Newton St.; cost, $3,200.

W. H. Thomas, 4 three-st'y dwells., 8-14 South Morgan St.; cost, $20,000; architects, Wilson & Moody.

J. B. Chiappe, 2 two-st'y stores and dwells., 703-705 West Van Buren St.; cost, $5,000.

M. M. O'Hare, two-st'y store and dwell., 2404 Indiana Ave.; cost, $4,300; architect, A. McIntosh.

C. Kazminski, 2 two-st'y flats, 39-41 Orchard St.; cost, $3,000.

C. E. Loder, 5 two-st'y flats, 909-917 Harrison St.; cost, $18,000; architect, J. S. Huber.

J. Routa, two-st'y dwell., 433 Seventeenth St.; cost, $4,000; architect and builder, L. Novey.

Fortune Bros. Brewing Co., two-st'y barn; cost, $6,000.

B. Lathrop, store, cor. Dearborn and Van Buren Sts.; cost, $16,000.

A. Berkson Bros., three-st'y store and flats, 569 South Canal St.; cost, $6,000.

J. Daehla, two-st'y dwell., 418 North Lincoln St.; cost, $3,000; builder, A. Kollhorst.

J. Wihlin, two-st'y store and dwell., 61 West Ohio St.; cost, $6,000; architect, H. S. Kley.

Mrs. E. Blair, two-st'y dwell., 16 Clarkson Ct.; cost, $3,500; architect, J. Smith; builder, G. Hinchliff.

J. H. McVicker, 2 additional stories, 78-84 Madison St.; cost, $100,000; architects, Adler & Sullivan.

W. A. Stevens, three-st'y dwell., 2623-2625 Wabash Ave.; cost, $15,000; architect, L. B. Dixon; builders, Fox & Hinds.

C. Stigo, two-st'y store and dwell., 3250 Wentworth Ave.; cost, $4,100.

P. Tinkler, three-st'y flats, 30-32 Delaware Pl.; cost, $10,000; architects, Treat & Foltz; builder, L. Kabell.

J. Zahrenger, two-st'y dwell., 2917 Fifth Ave.; cost, $3,200; architect, Stude.

Mary J. Hodge, 3 two-st'y dwells., 549-551 West Jackson St.; cost, $12,000; architect, W. Strippelman; builder, D. H. Wilkie.

F. Schweinfurth, 8 two-st'y dwells., 2933-2945 Groveland Park Ave.; cost, $30,000; architect, W. L. B. Jenney.

Geo. Paul, two-st'y dwell., 781 Larrabee St.; cost, $5,000; builder, N. Gerten.

S. Svabader, two-st'y store and dwell., 619 Thirteenth Pl.; cost, $4,800.

M. C. Meyer, two-st'y store and dwell., 957 Ogden Ave.; cost, $3,500.

J. J. Huber, two-st'y dwell., 120 Orchard St.; cost, $3,500.

C. Appel, two-st'y dwell., 464-466 Larrabee St.; cost, $3,000.

J. Klein, two-st'y dwell., 617 West Chicago Ave.; cost, $3,000.

New York.

CLUB-HOUSE. — The Mount Morris Club will build a club-house on the s s of One Hundred and Twenty-fifth St., between Madison and Fifth Aves.

HOUSES. — It is reported that Messrs. Chas. Buek & Co. will erect, on the n e cor. of Madison Ave. and Sixty-ninth St., four first-class residences, at a cost of about $350,000.

OFFICE-BUILDING. — On the n s of Wall St., between Broadway and Nassau St., a first-class office-building is to be erected, from designs of Mr. H. J. Hardenbergh.

STORES. — For the Hunter Estate, a five-st'y building 29′ x 72′ and 66′ 7½″ x 80′ 3″, is to be erected on the n w cor. of Reade and Hudson Sts., with fronts of brick, terra-cotta and iron, from plans of Mr. G. M. Huss.

BUILDING PERMITS. — *Mulberry St., No.* 194, two-st'y brick stable, gravel roof; cost, $9,000; owner, Patrick McCollum, 58 Prince St.; architect, Wm. Graul.

Norfolk St., No. 138, five-st'y brick store and workshop, tin roof; cost, $4,000; owner, Wolf Boroschek, 156 Henry St.; architect, Wm. Graul.

Scammel St., e s, 47′ n Cherry St., three-st'y brick stable, tin roof; owner, John Wallace, 55 West Thirty eighth St.; architect, Gage Insler.

Thirty-third St., n s, 81′ e Third Ave., 4 five-st'y brick tenements and stores, tin roofs; cost, each,

$20,000; owner, Marks Rinaldo, 230 East Thirty-third St.; architects, A. B. Ogden & Son.

West Forty-eighth St., No. 346, five-st'y brick tenement, tin roof; cost, $20,000; owner, Theodore Riehl, 203 West Forty-eighth St.; architects, Thom & Wilson.

Forty-ninth St., s s, 150′ e Ninth Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $16,000; owner, George Kick, 345 West Twenty-ninth St.; architects, Thom & Wilson.

Forty-ninth St., s s, 125′ e Ninth Ave., five-st'y brick tenements, tin roofs; cost, $16,000; owner, Wm. Mulgrew, 221 West Twentieth St.; architects, Thom & Wilson.

Ave. B, Nos. 261, 263 *and* 265, 3 five-st'y brick tenements and stores, tin roofs; owner, Chas. Dearden, 327 Lafayette Ave., Brooklyn; architect, A. Spence.

East Twenty-sixth St., Nos. 231 *and* 233, 2 five-st'y brick and stone tenements, tin roofs; cost, each, $18,000; owner, Jacques Bach, 240 East Twenty-seventh St.; architect, Jobst Hoffmann.

East Forty-first St., Nos. 110, 112 *and* 114, 3 five-st'y brick tenements, tin roofs; cost, each, $19,000; owner and architect, Jobst Hoffman, 153 Fourth Ave.

One Hundred and Thirteenth St., n s, 150′ e Third Ave., one-st'y brick stable and feed-store, tin roof; cost, $6,000; owner, John Kenn, 2171 Third Ave.; architect, Chas. Kinkel.

One Hundred and Seventeenty St., s s, 373′ e Pleasant Ave., 2 five-st'y brick tenements, tin roofs; cost, each, $15,800; owner, James Sweeney, Third Ave., cor. Twentieth Sts.; architects, Ebeling & Heinicke.

Madison Ave., s e cor. One Hundred and Tenth St., six-st'y brick apartment-house, tin roof; cost, $15,000; owner, Mary Dwinelle, 1539 Park Ave.; architect, J. F. Burrows.

Seventy-sixth St., n s, 200′ w Ninth Ave., 6 four-st'y brown-stone front dwells., tin roofs; cost, each, $20,000; owners, John T. and James A. Farley, 402 West Seventy-third St.; architects, Thom & Wilson.

Manhattan St., No. 5, three-st'y brick store, tin roof; cost, $5,500; owner, Annie E. Brown, One Hundred and Fifty-second St., near Boulevard; architects, D. & J. Jardine.

Eighth Ave., n e cor. One Hundred and Twenty-sixth St., five-st'y brick tenement and store, tin roof; cost, $25,000; owner, Maria Theresa McCormick, 269 West One Hundred and Twenty-sixth St.; architect, Theo. E. Thomson; builder, Jas. H. Parker; masons, Lally & Chartrand.

Eighth Ave., s w cor. One Hundred and Thirty-third St., five-st'y brick tenement and store, tin roof; cost, $18,000; owner and builder, Peter McCormack, 420 East One Hundred and Fourteenth St.; architect, J. H. Valentine.

Eighth Ave., w s, 25′ s One Hundred and Thirty-third St., five-st'y brick tenement and store, tin roof; cost, $18,000; owner, builder and architect, same as last.

Eighth Ave., w s, 50′ s One Hundred and Thirty-third St., 2 five-st'y brick tenements and stores, tin roofs; cost, each, $18,000; owner, builder and architect, same as last.

One Hundred and Forty-fifth St., s s, 132′ e St. Nicholas Ave., 2 four-st'y brick tenements, tin roofs; cost, each, $10,000; owner, John B. Haskin, Fordham; architect and builder, A. B. Marshall.

One Hundred and Twenty-ninth St., n s, 200′ w Third Ave., one-st'y brick car-house, tin roof; cost, $5,000; owner, Third Ave. R. R. Co., office Sixty-fifth St. and Third Ave.

Third Ave., w s, 65′ n One Hundred and Fiftieth St., two-st'y frame stable, gravel roof; cost, $3,500; owner, Peter J. Zugner, Third Ave., near One Hundred and Sixty-eighth St.; architect, Adolph Pfeiffer; builders, Janson & Jaeger.

Thomas Ave., e s, 200′ s Kingsbridge Road, 2 two-st'y frame dwells., tin roofs; cost, each, $3,000; owner, John B. Haskin, Fordham; architect and builder, A. B. Marshall.

Hull Ave., e s, 100′ s Suburban St., 3 two-st'y frame dwells., shingle roofs; cost, each, $3,800; owner, Twenty-fourth Ward Real Estate Association, 111 Broadway; architect, E. A. Marsh; builders, E. J. Hedden & Son.

East One Hundred and Fifty-seventh St., No. 630, three-st'y frame tenement, tin roof; cost, $5,000; owner, Mary C. Muller, on premises; builder, Alexander Weir.

Third Ave., e s, 150′ s One Hundred and Fifty-sixth St., three-st'y frame tenement, tin roof; cost, $6,500; owner, Peter Herlich, Third Ave., cor. One Hundred and Fifty-sixth St.; architect, Adolph Pfeiffer.

Northern Terrace, n s, 500′ w Riverdale Ave., Twenty-fourth Ward, two-and-one-half-st'y frame dwell., tin and slate roof; cost, $4,300; owner, Wm. E. Thorn, Riverdale; architect and builder, Samuel L. Berrian.

Morris Ave., n s, 100′ n One Hundred and Thirty-eighth St., three-st'y brick dwell., tin roof; cost, $4,000; owner, M. Schmiderer, on premises; architect, Hugo Seller; builder, not selected.

Alterations. — *Sixth Ave., No.* 408, raise top story three feet and a four-st'y brick extension, tin roof; cost, $4,000; owner, Mrs. Horace Stokes, Hoffman House; architect, L. H. Broome; builder, R. Chidwick.

Prince St., No. 181, one-st'y brick extension on rear, tin roof; cost, $4,000; owner, Anthony Reisert, on premises; builder, John Leslie.

Fifth Ave., No. 321, front and interior alterations; cost, $12,000; lessee, Edward Leissner; owner, Mrs. Elizabeth Underhill, Garrison, N. Y.

New Chambers St., No. 70, interior alterations, windows, etc.; cost, $4,000; owner, Augustus W. Cruikshank, 346 West Eighty-fourth St.; architect, R. S. Townsend; builder, R. Townsend.

One Hundred and Thirtieth St., n s, 100′ w Eleventh Ave., add one-st'y, iron columns, first st'y, cellar walls underpinned, etc.; cost, $12,000; owner, George H. H. Butler, 126 East Twenty-ninth St.; architect, G. B. Pelham.

East Eleventh St., No. 21, one-st'y and basement brick extension, tin roof; cost, about $5,000; owner, Henry E. Jones, 14 West Twenty-third St.; architect, D. Burgess; builders, D. & E. Herbert and E. Mills.

Third Ave., No. 2273, one-st'y brick extension, tin roof; cost, $3,275; owner, Wm. H. Jacobs, 255 West Thirty-fourth St.; architect, Jas. S. Wightman; builders, J. & W. C. Spears and W. Elderd.

Lexington Ave., n e cor. Forty-fourth St., three-st'y brick extension, tin roof, also fronts altered for stores; cost, $9,000; owner, Joseph J. Keenan, 105 West Forty-sixth St.; architect, C. Rentz.

Third Ave., No. 1332, five-st'y brick extension, tin roof; cost, $7,000; owner, Wm. Ray, on premises; architect, J. C. Burne; builder, not selected.

Second Ave., No. 1332, five-st'y brick extension, tin roof; cost, $7,000; owner, Wm. Ray, on premises; architect, J. C. Burne; builder, not selected.

West Sixteenth St., No. 232, add one st'y, also five-st'y brick extension, tin roof; cost, $7,500; owner, John Eggers, on premises; architect, E. Gruwe.

East Fifty-fourth St., Nos. 307 *and* 309, new store front, two new windows, fit up new offices in oak, shift stairs to rear; cost, $4,500; owner, S. B. Wortmann, 126 East Seventy-ninth St.; architect and builder, R. McArtney.

Delancey St., No. 166; raise attic to full story, new flat roof and new partitions; cost, $4,000; owners, Samuel Full, 226 East Fifty-third St., and Seligman Full, 312 East Fiftieth St.; architect, Richard Berger; foundries, H. D. Powers.

One Hundred and Twenty-third St., s s, 186′ 4″ w Third Ave., three-st'y brick extension, tin roof; cost, $5,000; owner, Jere. Lyons, 21 East One Hundred and Twenty-seventh St.; architects, Babcock & McAvoy.

Seventh Ave., s e cor. Twenty-second St., one-st'y brick extension, tin roof; cost, $3,500; owner, Nicholas Wernet, 210 West Twenty-first St.; architects, Thom & Wilson.

One Hundred and Sixth St., s s, 263′ e First Ave., one-st'y brick extension, tin roof; cost, $4,500; owner, Lehman Levy, 322 East One Hundred and Sixteenth St.; architect, F. W. Klemt.

East Broadway, No. 169, repair damage by fire; cost, $3,000; owner, Herman Korn, 157 East Sixty-fifth St.; architect, J. B. Snook; builder, N. Smith.

Jane St., Nos. 164 *and* 166, raise two stories, new flat roof, take down and rebuild front wall and internal alterations; cost, $8,000; owners, Worthen & Aldrich; architect, M. Snedecker.

Broadway, Nos. 60 *and* 62 to be connected for the Consolidated Stock and Petroleum Board, from plans of Mr. Edward E. Raht.

Washington St., No. 201, raise building from five and five and one-half to seven stories, etc.; cost, $7,000; owner, Thomas R. McNeil, 199 Washington St.; architect, M. V. B. Ferdon; builder, James P. Niblo.

Warren St., No. 32, and along *Church St.*, to No. 102 Chambers St., raise one st'y; cost, $12,000; agent for owner, Spencer Aldrich, 93 Park Ave.; architect, Samuel A. Warner; builder, not selected.

West Twenty-fifth St., Nos. 544, 546 *and* 548, rebuild westerly, easterly, and part of rear walls; cost, $4,000; owner, Warren M. Merrill, on premises; builder, John G. McMurray.

West Sixth Ave., near Washington Pl., repair damage by fire; cost, $5,000; owner, St. Joseph's Roman Catholic Church, cor. Sixth Ave. and Washington Pl.; architect, Arthur Crooks; builder, Mr. Doyle.

West Thirty-sixth St., Nos. 533 *to* 541, five-st'y extension on westerly side, gravel roof; cost, $15,000; owners, Rohe & Bro., 334 and 350 West Thirty-third St.; architects, Thom & Wilson.

Fifth Ave., No. 204, one-st'y brick extension, tin roof, also internal alterations for business purposes; cost, $20,000; lessee, Wm. Schaus, 749 Broadway; architect, Geo. Martin Huss; builders, W. A. & F. E. Conover.

East Seventeenth St., No. 606, two-st'y brick extension, tin roof; cost, $3,000; owners, Koenig & Schuster, Greenwich St., cor. Harrison St.; architect, Julius Boekell.

Manhattan St., No. 4, through to One Hundred and Twenty-ninth St., three-st'y brick extension, tin roof; cost, $3,000; owner, Mrs. J. Romaine Brown; architects, D. & J. Jardine, 1262 Broadway.

Ninth Ave., n w cor. Seventy-eighth St., build new chimney-stacks, reconstruct fire-proof partitions, new boiler-room, etc.; cost, $100,000; owners, Milliken & Smith, 95 Liberty St.; architects, D. & J. Jardine.

East Forty-first St., No. 58, two-st'y brick extension, gravel roof; cost, $8,000; lessees, Hunting & Hammond, Park Ave. and Fortieth St.; architect, Stephen D. Hatch; builders, A. A. Andruss & Son and James Elgar.

Division St., No. 51, and *East Broadway, No.* 64, raise one st'y, to be altered internally, and made into two separate tenements; cost, $18,000; owner, Harris Cohen, 134 White St.; architect, E. W. Greis.

Essex St., No. 151, four-st'y brick extension, tin roof; cost, $3,000; owner, Margaret Hauselmann, 197 Third Ave.; architect, E. W. Greis.

Spring St., No. 307, raise two stories; cost, $3,000; owners, Henry and John Stemme, 13 Bowery; architect, Wm. Graul.

Monroe St., No. 244, raise attic to full story and a one-st'y extension, rebuild front and rear wall, alter basement to store; cost, $3,500; owner, Henry Cohen, 225 East Seventy-ninth St.; architect, C. Baxter.

East Twenty-ninth St., No. 318, raise one-st'y; cost, $4,500; owner, John H. Hankinson, 105 East Twenty-fifth St.; architects, Alf. Zucker & Co.; builder, not selected.

Eighth Ave., No. 838, one-st'y brick extension, tin roof, new store floor, put in iron girder and posts in first story; cost, $3,000; owner, Estate of Peter A. Hegeman, by Peter A. A. Hegeman, 150 Broadway; architect, John Sexton.

Thirteenth St., No. 432, five-st'y brick extension, tin roof, take out front wall in first story, and put in iron girder and columns, new shew windows, etc.; cost, $13,000; owner, Geo. B. Dean, 277 West Eleventh St.; architect, G. W. Walters; builder, not selected.

The Burr Printing-House, 14 Jacob St., is to have a six-st'y fire-proof addition built, by Mr. Frank D. Harmon, from plans of Alfred H. Thorp.

Philadelphia.

Factory.—Walter H. Gessinger, architect, is to build for A. M. Collins Son & Co., at the cor. of American and Oxford Sts., a five-st'y brick factory, 120′ x 241′, together with other supplementary buildings.

Building Permits.—*Annin St., No.* 2129, two-st'y stable, 14′ x 28′; Andrew Hughes, owner.

Fifty-seventh St., n e cor. of Vine St., 2 two-st'y dwells., 14′ x 28′ and 16′ x 44′; Wells & Son, contractors.

Pear St., above Fairmount Ave., 2 two-st'y dwells., 13′ x 30′; Wm. Perrins, owner.

Gleason St., above Ridge Ave., two-st'y shop, 34′ x 34′; Chas. Wagner, owner.

Emerald St., above Huntingdon St., 2 two-st'y dwells., 14′ x 42′; Henry Foote, contractor.

Clifton St., cor. Alleghany Ave., three-st'y dwell., 13′ x 35′; Lewis J. Wolf, owner.

Federal St., No. 1024, three-st'y dwell., 18′ x 48′; Robert Thompson, contractor.

Second St., below Tioga St., 2 two-st'y dwells., 17′ x 48′; Jno. Trainor, contractor.

Lex St., below Silverton Ave., 6 two-st'y dwells., 14′ x 30′; E. C. Adams, contractor.

Hope St., below Cumberland St., two-st'y stable, 20′ x 30′; Wm. McFarland, contractor.

Twenty-second St., s e cor. Washington Ave., one-st'y foundries; Geo. C. Payne, contractor.

Turner St., below Venango St., 4 two-st'y dwells., 15′ x 30′; Abraham Ruble, contractor.

Whitney St., No. 715, three-st'y dwell., 18′ x 38′; Samuel Tudor, contractor.

Emerald St., cor. Franklin Ave., 17 two-st'y dwells., 15′ x 43′; J. R. Pyle, contractor.

Fifth St., above Tioga St., 2 two-st'y dwells., 17′ x 44′ and 16′ x 45′; Jas. H. Dorff, contractor.

Front St., below Dauphin St., two-st'y stable, 18′ x 24′; Geo. Kessler, contractor.

St. Louis.

Building Permits.—Ninety-seven permits have been issued since our last report, fourteen of which are for unimportant frame houses. Those of the rest worth $2,500 and over are as follows: —

C. S. Crane, two-st'y frame dwell.; cost, $2,500.

W. G. McKee, two-st'y frame dwell.; cost, $15,000; J. B. Lindsley & Son, contractors.

Wm. Werner, two-st'y brick dwell.; cost, $3,200; A. Deitz, contractor.

T. Gartland, two-st'y brick dwell.; cost, $3,000; J. V. Mayors, architect; A. McAllister, contractor.

G. W. Pipe, 2 adjacent, two-st'y brick dwells.; cost, $5,000; G. W. Pipe, architect; G. W. Pipe, contractor.

D. L. Parrish, two-st'y brick dwells.; cost, $5,000; Grable & Weber, architects; B. F. Stadelmeyer, contractor.

H. Bier, two-st'y double brick tenement; cost, $3,500; P. Tiemann, contractor.

C. Kunst, 4 adjacent two-st'y brick tenements; cost, $7,994; Helm & Bro., contractors.

J. V. Sullivan, two-st'y brick dwell.; cost, $3,000; Th. Furiong, architect; M. B. Scanlan, contractor.

J. Halpin, addition to three-st'y store and tenement; cost, $4,500; McNamara, architect; O'Mallory & Bro., contractors.

P. Huhn, three-st'y store and tenement; cost, $5,000; C. F. May, architect; Biermann & Ahring, contractors.

Henry Huelsman, two-st'y store and tenement; cost, $4,000; C. F. May, architect; J. Yaeger, contractor.

G. R. Wilson, 6 adjacent two-st'y dwells.; cost, $20,000; S. C. Cairns, architect; sub-let.

A. Cooper, 5 adjacent two-st'y dwells.; cost, $25,000; H. E. Piper, architect; sub-let.

Mrs. M. L. Howard, two-st'y brick store and dwell.; cost, $2,500; Thos. W. Brady, architect, J. Wasling, contractor.

Geo. Maunbach, two-st'y brick dwell.; cost, $2,900; T. S. Green, contractor.

J. D. McAdaris, 2 three-st'y brick flats; cost, $34,000; G. I. Barnett & Son, architects; sub-let.

Mrs. Rittmann, two-st'y brick tenement; cost, $3,500; Wm. Paul, contractor.

Mr. Cook, two-st'y brick dwell.; cost, $2,500; Pat. Brennan, contractor.

Mr. Cook, two-st'y brick dwell.; cost, $2,500; Pat. Brennan, contractor.

A. Busch, three-st'y store and hall; cost, $14,000; H. Cameron, architect and contractor.

Mrs. W. Wartman, 3 adjacent two-st'y dwells.; cost, $6,500; H. C. Rocklage, contractor.

Henry W. Rocklage, 2 adjacent two-st'y dwells.; cost, $4,000; H. C. Rocklage, contractor.

H. Nicolaus, two-st'y brick dwell.; cost, $7,000; H. Franke, contractor.

J. A. Schultz, addition two-st'y dwell.; cost, $7,600; A. Wagner, contractor.

Miles Sells, three-st'y brick store and dwell.; cost, $16,000; Chas. E. Illsley, architect, Barnett & Duffner, contractors.

J. Barney, two-st'y brick dwell.; cost, $4,000; J. E. Newberry, contractor.

Wm. Nopte, two-st'y brick dwell.; cost, $3,500; B. J. Goesse, architect; F. Frankmann, contractor.

C. Luke, 3 adjacent two-st'y tenements; cost, $5,000; Rothe & Rattermann, contractors.

W. Cibulka, two-st'y brick dwell.; cost, $3,000; Klute & Hildebrand, contractors.

Wm. Luffel, 4 adjacent two-st'y dwells.; cost, $8,000; Klute & Hildebrand, contractors.

Wm. Fegelhoff, 4 adjacent two-st'y dwells.; cost, $3,500; Goesse & Remmers, contractors.

J. Pickel, two-st'y brick dwell.; cost, $3,000; B. J. Goesse, architect.

J. F. Brüggeman, two-st'y brick dwell.; cost, $3,500; Mr. Laue, contractor.

Mrs. E. Bakers, 2 adjacent two-st'y tenements; cost, $3,800; A. M. Baker, architect; sub-let.

W. C. Popp, two-st'y brick dwell.; cost, $4,500; Wm. Whri, architect; W. C. Popp, contractor.

J. Schimmelpling, 3 adjacent two-st'y brick dwells.; cost, $5,500; T. Mueller, contractor.

D. Welscher, 2 adjacent two-st'y brick dwells.; cost, $4,000; F. Mueller, contractor.

G. Geers, 2 adjacent two-st'y brick dwells.; cost, 4,000; F. Mueller, contractor.

Jas. O. Neil, 7 adjacent two-st'y dwells.; cost, $16,000; P. T. Meagher, architect; sub-let.

(*Continued in Supplement page* 4.)